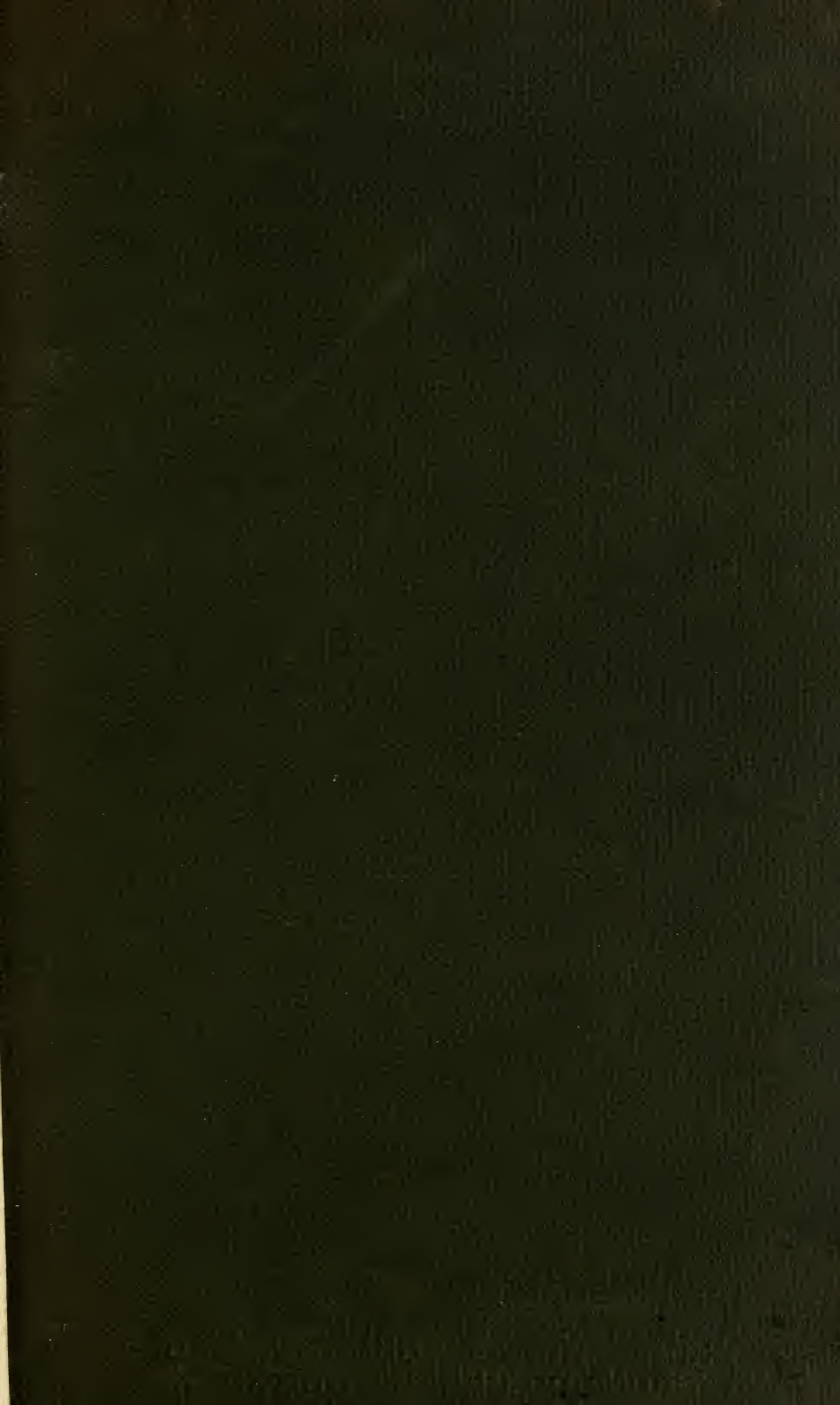


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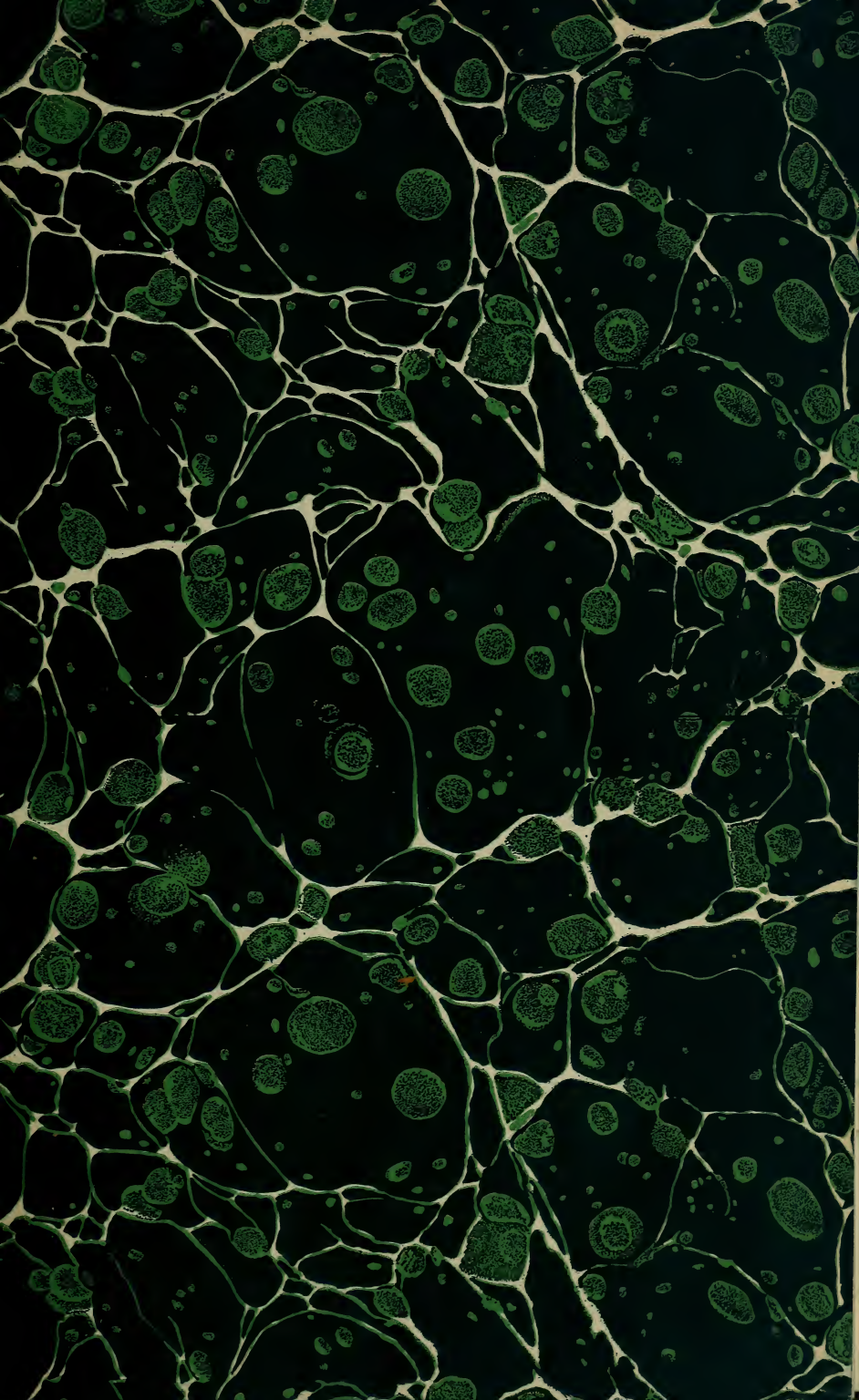


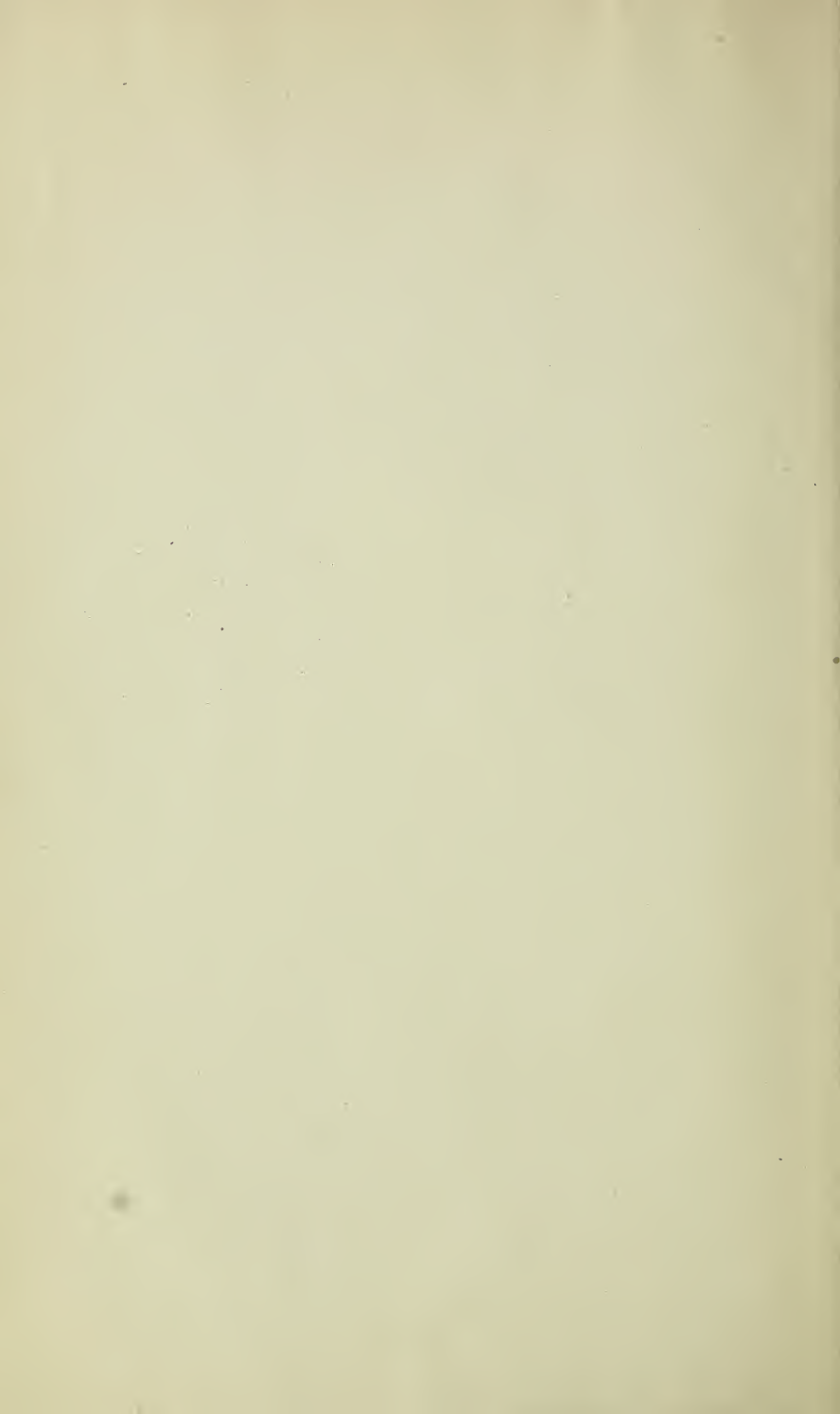


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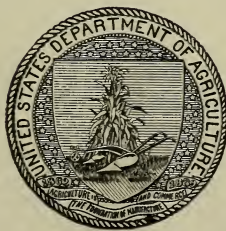


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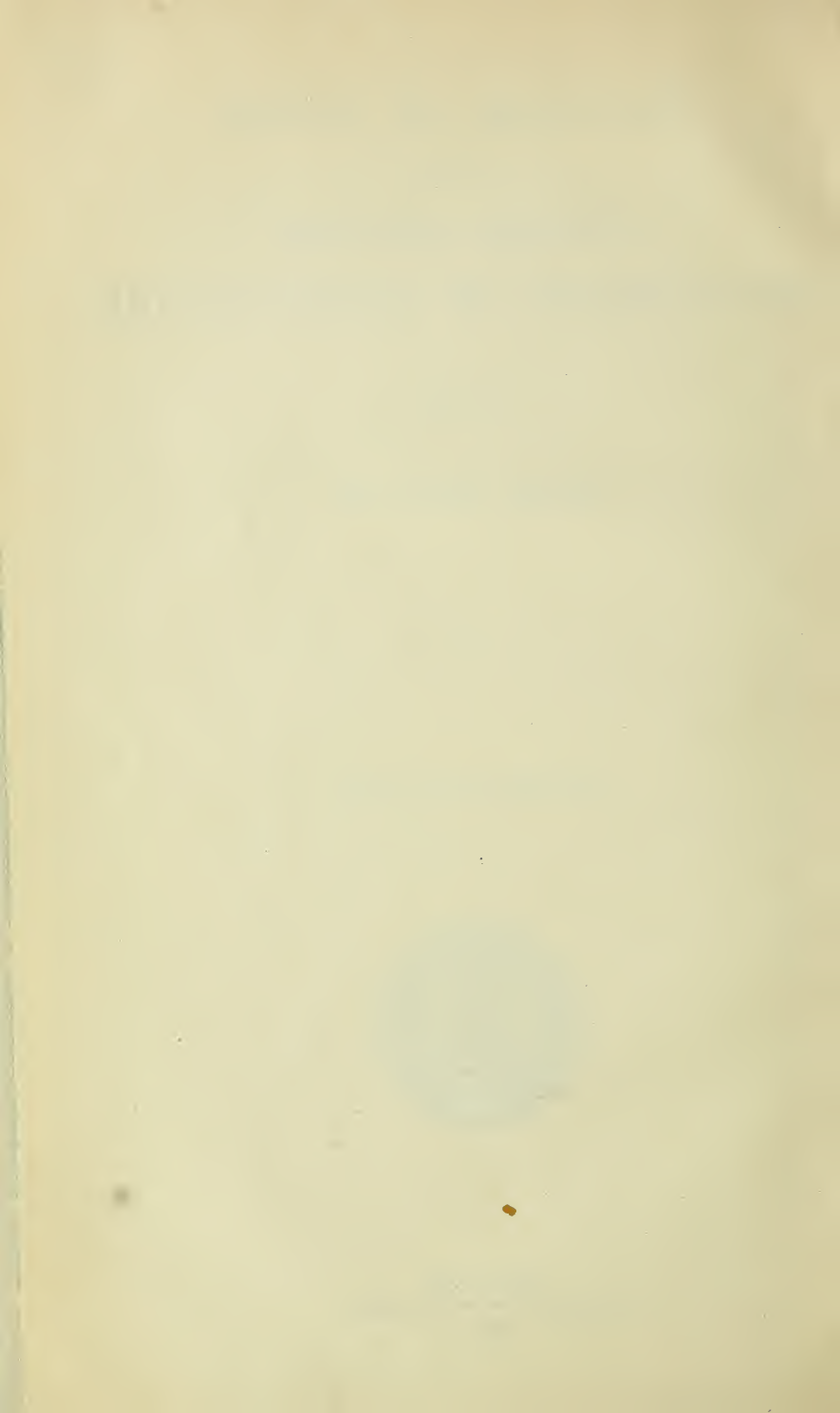
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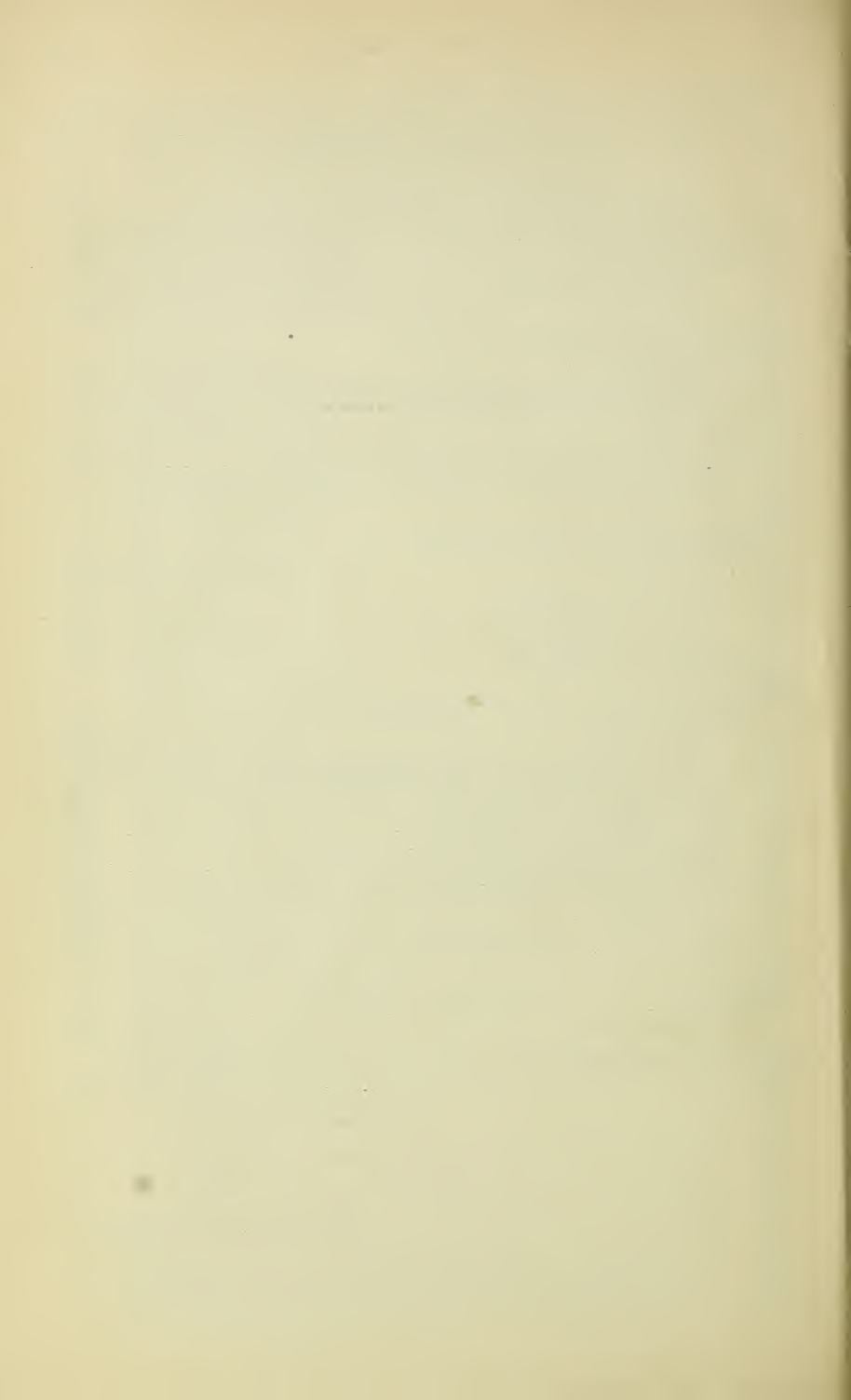
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# PROGRAM OF WORK OF UNITED STATES DEPARTMENT OF AGRICULTURE FOR THE FISCAL YEAR 1915.

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## OFFICE OF THE SECRETARY.

### SECRETARY'S OFFICE.

#### Secretary's Office:

*Object.*—The Secretary of Agriculture is charged with the work of promoting agriculture in its broadest sense. He exercises general supervision and control over the affairs of the department and formulates and establishes the general policies to be pursued by its various branches and offices.

*Cooperation.*—Congress, other departments, the respective States, and the several branches of this department.

*Location.*—Washington, D. C.

*Date begun.*—Department was created in 1862; raised to the rank of an executive department in 1889.

*Assignment.*—David F. Houston.

*Proposed expenditures, 1914-15.*—\$20,590 (statutory, Office of Secretary, \$17,590; miscellaneous expenses, \$3,000).

### ASSISTANT SECRETARY'S OFFICE.

#### Assistant Secretary's Office:

*Object.*—The Assistant Secretary of Agriculture becomes Acting Secretary in the absence of the Secretary and assists in the general supervision of the work of the department. He is also charged with certain special duties, which include direct supervision of (1) the scientific and technical investigations of the department; (2) miscellaneous clerical and minor changes in the personnel of the department; (3) the publication of results of investigations and experiments; and (4) the preparation of annual reports and estimates.

*Cooperation.*—Other departments and all branches of this department.

*Location.*—Washington, D. C.

*Date begun.*—The office of assistant secretary was created in 1889.

*Assignment.*—Carl Vrooman.<sup>1</sup>

*Proposed expenditures, 1914-15.*—\$11,580 (statutory, \$8,480; miscellaneous expenses, \$3,100).

### SOLICITOR'S OFFICE.

#### Solicitor's Office:

*Object.*—The solicitor is charged by law (act of May 26, 1910) with the direction of the legal work of the department. Accordingly, he acts as legal adviser to the Secretary and the heads of the several branches of the department, conducts its legal work, and represents it in all legal matters. He approves, in advance of issue, all orders and regulations promulgated by the Secretary under statutory authority.

*Cooperation.*—All branches of the department, United States attorneys, etc.

*Location.*—Washington, D. C.; Missoula, Mont.; Portland, Oreg.; Ogden, Utah; San Francisco, Cal.; Denver, Colo.; and Albuquerque, N. Mex.

*Date begun.*—July 1, 1905 (General Order 85).

*Assignment.*—Francis G. Caffey.

*Proposed expenditures, 1914-15.*—\$152,480 (statutory, \$89,480; acquisition of lands, \$60,000;<sup>2</sup> miscellaneous expenses, \$3,000).

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<sup>1</sup> Assumed office August 12, 1914.

<sup>2</sup> Also included under Forest Service.

## LIBRARY.

**Library:**

*Object.*—To supervise the work of the main library of the department. The library is charged with the purchase of all books and periodicals, and supervises their arrangement and cataloguing; prepares for publication bibliographies of special subjects, and also has charge of the foreign mailing lists for the department publications.

*Cooperation.*—All branches of the department, the Congressional Library, and other libraries in and outside of Washington, D. C.

*Location.*—Washington, D. C.

*Date begun.*—1862.

*Results.*—The library has been enriched by approximately 5,259 accessions during the fiscal year ended June 30, 1914, not including current numbers of periodicals or unbound serials.

*Assignment.*—Claribel R. Barnett.

*Proposed expenditures, 1914-15.*—\$46,260 (statutory, Office of Secretary, \$900; statutory, library, \$27,860; general expenses, library, \$17,500).

## OFFICE OF INFORMATION.

**Office of Information:**

*Object.*—To secure the widest possible circulation for the discoveries and recommendations of the scientists, specialists, and field workers of the department; agricultural advice, warnings, and information as to regulatory matters; to supply to the public press facts taken from publications, and also from oral statements of specialists, in a form to attract attention and lead to the adoption of the methods recommended. It is planned to develop in connection with this work specialized information service exclusively for agricultural papers.

*Cooperation.*—All branches of the department. The office also issues a Weekly News Letter to Crop Correspondents containing seasonal and other information in a popular form.

*Location.*—Washington, D. C.

*Date begun.*—June 7, 1913.

*Assignment.*—G. W. Wharton.

*Proposed expenditures, 1914-15.*—\$7,270 (statutory, \$4,520; miscellaneous expenses, \$2,750). Details from other bureaus and offices, \$13,180.

## OFFICE OF INSPECTION.

**Office of Inspection:**

*Object.*—To act as the clearing house of the Secretary's Office in fiscal transactions between the bureaus and claimants, and otherwise assist in the fiscal operations of the bureaus; handle fiscal correspondence between the Secretary's Office and the Treasury; prepare certain annual and other reports; supervise and control personnel inspection matters of the department.

*Cooperation.*—All branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—May 1, 1914.

*Assignment.*—Alex. McC. Ashley.

*Proposed expenditures, 1914-15.*—\$19,600 (statutory, Office of Secretary, \$15,550; statutory, Division of Accounts, \$3,700; miscellaneous expenses, \$350). Detail from Bureau of Animal Industry, \$2,250.

## DISBURSING OFFICE.

**Disbursing Office:**

*Object.*—To keep appropriate ledgers relative to the advance and disbursement of all items of appropriations and to pay all accounts properly certified by the various branches of the department.

*Cooperation.*—All branches of the department.

*Location.*—Washington, D. C.

*Assignment.*—A. Zappone.

*Proposed expenditures, 1914-15.*—\$44,620 (statutory, Division of Accounts, \$42,620; miscellaneous expenses, \$2,000).

## OFFICE OF EXHIBITS.

**Office of Exhibits:**

*Object.*—To handle the correspondence of the department relative to exhibits at fairs and expositions of various kinds; cooperate with the several branches of the department in preparing exposition material; ship, install, care for, and demonstrate such exhibits; and investigate methods of displaying them. During the present year preparations will be made to conduct exhibits at the Panama-Pacific International Exposition, San Francisco, and at the International Dry Farming Congress, Wichita, Kans.

*Cooperation.*—All branches of the department, State Department, Government Exhibit Board, State experiment stations, and fair, exposition, and show associations of various kinds throughout the United States.

*Location.*—Washington, D. C.

*Date begun.*—Made a distinct office July 1, 1913.

*Results.*—Since July 1, 1913, has handled agricultural exhibits at the following expositions: International Congress of Refrigeration, Chicago, Ill.; National Conservation Congress, Knoxville, Tenn.; International Dry Land Congress, Tulsa, Okla.; Sixth National Corn Exposition, Dallas, Tex.; Forest Products Expositions, Chicago, Ill., and New York, N. Y.; minor fairs, expositions, displays, etc.

*Assignment.*—F. Lamson-Scribner.

*Proposed expenditures, 1914-15.*—\$65,070 (statutory, \$4,200; extra labor, \$720; Dry Farming Congress, \$20,000; sundry civil, \$40,000; miscellaneous expenses, \$150).

## OFFICE OF FOREST APPEALS.

**Office of Forest Appeals:**

*Object.*—Created for the purpose of having, under the immediate supervision of the Secretary, an officer, independent of the Forest Service, by whom appeals from the decision of that bureau affecting land claims and land classification matters might be passed upon, after a careful examination of the record and a consideration of the questions involved, in order that the Secretary might thus be assisted in reaching a final decision. At the direction of the Secretary, the office also cooperates with the Office of Inspection in the investigation of personnel cases, involving discipline, demotion, or dismissal, and complaints by or against bureau or department officers.

*Cooperation.*—Forest Service in appeal cases; Office of Inspection, in connection with personnel cases.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—During the past year 46 appeal cases and 9 petitions or requests for review have been considered and recommendations made thereon for action by the Secretary; 13 personnel cases have been investigated.

*Assignment.*—Thos. G. Shearman.

*Proposed expenditures, 1914-15.*—\$50 (miscellaneous expenses). Also supported by transfer of \$4,200 from general expenses, Forest Service.

## CHIEF CLERK'S OFFICE.

**Chief Clerk's Office Proper.**

*Object.*—The chief clerk has general supervision of clerks and employees; of the order of business and of the records and correspondence of the Secretary's Office; and of expenditures from appropriations for miscellaneous expenses, rent of buildings, etc. He is responsible for the enforcement of the general regulations of the department and is custodian of the buildings. This project includes work of the time clerk, operation of the telephone and telegraph booth, and provision for miscellaneous supplies and services for the department as a whole.

*Cooperation.*—Various branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—1862.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$42,250 (statutory, \$20,240; extra labor, \$720; miscellaneous expenses, \$21,290).

**Appointment Clerk's Office:**

*Object.*—To prepare all papers relating to appointments, transfers, promotions, reductions, details, furloughs, and removals; to keep personal records of employees, etc.

*Cooperation.*—All branches of department.

*Location.*—Washington, D. C.

*Date begun.*—Many years ago; first actual detail of appointment clerk, 1891.

*Assignment.*—R. W. Roberts.

*Proposed expenditures, 1914-15.*—\$14,655 (statutory, \$14,020; extra labor, \$360; miscellaneous expenses, \$275).

**Supply Section:**

*Object.*—To make purchases of stationery and miscellaneous supplies for the Office of Secretary and the various bureaus; and to receive and dispose of, by sale or otherwise, all property turned in by the various bureaus and offices when of no further use; also to sell unused samples of products secured in connection with the enforcement of the Food and Drugs Act and the Insecticide Act.

*Cooperation.*—All branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—About 1883.

*Assignment.*—C. B. Lower.

*Proposed expenditures, 1914-15.*—\$15,100 (statutory, \$7,300; miscellaneous expenses, \$7,800). Detail from Bureau of Plant Industry, \$720.

**Chief Engineer's Office:**

*Object.*—To supervise the engineers, firemen, and elevator-operator force, except those of Weather Bureau, and to provide heat, light, power, and electricity for all buildings of department, except Weather Bureau and Forest Service.

*Cooperation.*—Various branches of department.

*Location.*—Washington, D. C.

*Assignment.*—R. Augusterfer.

*Proposed expenditures, 1914-15.*—\$65,968 (statutory, \$27,000; miscellaneous expenses, \$38,968). Detail from other bureaus and offices, \$2,160.

**Mail and Files:**

*Object.*—To receive, record, and distribute mail for the Office of Secretary; index, copy, file, and dispatch correspondence. The department post office receives, distributes, and dispatches mail handled between the city post office and the several bureaus.

*Cooperation.*—Other branches of department.

*Location.*—Washington, D. C.

*Date begun.*—1862.

*Results.*—Approximately 350,000 letters, papers, etc., handled during the year.

*Assignment.*—Joseph Haley.

*Proposed expenditures, 1914-15.*—\$16,160 (statutory, \$14,480; extra labor, \$720; miscellaneous expenses, \$960).

**Watch Force:**

*Object.*—To protect and watch 17 buildings occupied by the department in three shifts, covering the entire 24 hours.

*Location.*—Washington, D. C.

*Date begun.*—1862.

*Results.*—One fire detected and extinguished by watchman.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$37,000 (statutory, \$30,280; extra labor, \$4,620; miscellaneous expenses, \$2,100).

**Shop Force:**

*Object.*—To maintain mechanical shops for the repair and upkeep of the buildings, laboratories, and equipment, including carpenter work, cabinet work, and painting.

*Cooperation.*—Various branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—June 30, 1909.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$72,477 (statutory, \$46,220; extra labor, \$6,260; miscellaneous expenses, \$19,997).

**Char Force:**

*Object.*—To clean and keep in sanitary condition the halls and toilets of the department buildings, and to clean the rooms in the different units of the Office of Secretary.

*Cooperation.*—Various branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—Many years ago.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$20,300 (statutory, \$19,800; miscellaneous expenses, \$500).

**Rubber Stamp Work:**

*Object.*—To manufacture rubber stamps for official use.

*Cooperation.*—All branches of department except Weather Bureau.

*Location.*—Washington, D. C.

*Date begun.*—1895.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$1,940 (statutory, \$840; miscellaneous expenses, \$1,100). Detail from Office of Public Roads, \$1,440.

**Stables:**

*Object.*—To feed, care for, and drive the horses and care for the vehicles used by the Office of the Secretary and the Division of Publications.

*Location.*—Washington, D. C.

*Date begun.*—Many years ago.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$8,190 (statutory, \$4,980; extra labor, \$600; miscellaneous expenses, \$2,610).

**Rent in the District of Columbia:**

*Object.*—To administer the appropriation for rent in the District of Columbia for the various bureaus and other branches of the department, 21 buildings and parts of buildings being under rental.

*Location.*—Washington, D. C.

*Date begun.*—Many years ago.

*Assignment.*—R. M. Reese.

*Proposed expenditures, 1914-15.*—\$108,329 (rents).

**Total, Chief Clerk's Office,** \$402,369 (statutory, \$185,160; extra labor, \$13,280; miscellaneous expenses, \$95,600; rents, \$108,329). Details from other bureaus and offices, \$4,320.

**WEATHER BUREAU.****CENTRAL OFFICE.****GENERAL ADMINISTRATION.****Office of Chief:**

*Object.*—To direct the policy and business affairs of the bureau and to supervise its scientific activities.

*Location.*—Washington, D. C.

*Date begun.*—1891 (date of transfer of meteorological work to the Department of Agriculture; meteorological work began November 1, 1870, under War Department, Signal Corps, U. S. A.).

*Assignment.*—C. F. Marvin.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses, \$2,600; statutory, \$7,400).

**Office of Chief Clerk:**

*Object.*—To supervise the personnel of the bureau, carry on administrative, clerical, and other work in connection with files, mail, drawings, photographs, lantern slides; care for buildings and grounds, stable, horses, and vehicles.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—C. C. Clark.

*Proposed expenditures, 1914-15.*—\$64,730 (general expenses, \$14,810; statutory, \$49,920).

**Telegraph and Telephone:**

*Object.*—To maintain a branch telegraph and telephone office for the administrative and overhead functions of the Washington office.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—C. C. Clark.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses, \$1,350; statutory, \$650).

**Stations and Accounts:**

*Object.*—To supervise the issuing of authorizations for all expenditures; audit, adjust, and prepare for payment all accounts and claims against the Weather Bureau, and keep all books and other records in connection therewith; prepare annual estimates of appropriations; select and rent quarters and offices; supervise the construction and repair of all Weather Bureau buildings outside of Washington.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—D. T. Maring.

*Proposed expenditures, 1914-15.*—\$25,000 (general expenses, \$4,550; statutory, \$20,450).

**Supplies:**

*Object.*—To supervise, purchase, and distribute all Weather Bureau supplies; care and account for all Weather Bureau property; provide for the condemnation, sale, and disposition by other means of property and supplies lost, stolen, or worn out in service.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—B. F. Blundon.

*Proposed expenditures, 1914-15.*—\$15,400 (general expenses, \$1,340; statutory, \$14,060).

**Instruments:**

*Object.*—To supervise the selection, issue, exposure, and installation of the entire instrumental equipment of the bureau; conduct all tests incidental to their inspection; make necessary repairs and designs, and construct new types of apparatus.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—B. F. Kadel.

*Proposed expenditures, 1914-15.*—\$15,400 (general expenses, \$1,260; statutory, \$14,140).

**Forecasts:**

*Object.*—To supervise all forecast work done at outlying stations of the bureau, including publication and dissemination by maps, cards, telegraph and telephone messages, and press reports of weather synopses and general forecasts.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—H. E. Williams.

*Proposed expenditures, 1914-15.*—\$9,200 (general expenses, \$3,900; statutory, \$5,300).

**River and Flood Work:**

*Object.*—To supervise the river and flood work conducted at the outlying stations, including their coordinated and related substations; maintain river gauging stations, and disseminate river information.

*Cooperation.*—Forest Service and Geological Survey.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—A. J. Henry.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses, \$2,400; statutory, \$2,600).

**Climatological Work:**

*Object.*—To supervise cooperative and special stations maintained in connection with the corn, wheat, cotton, sugar, and rice industries; check and verify station reports and file original records at the central office; supervise the publication at section centers of the monthly reports of climatological data.

*Cooperation.*—Canadian Government.

**Climatological Work—Continued.***Location.*—Washington, D. C.*Date begun.*—1891.*Assignment.*—P. C. Day.*Proposed expenditures, 1914-15.*—\$28,800 (general expenses, \$3,800; statutory, \$25,000).**Editorial Office:***Object.*—To supervise all editorial work in connection with manuscripts of technical meteorological papers submitted for publication, including the Monthly Weather Review, its supplement, annual summary, and any other publications of a general meteorological character that may be authorized.*Location.*—Washington, D. C.*Date begun.*—1891.*Assignment.*—C. Abbe.*Proposed expenditures, 1914-15.*—\$6,200 (general expenses, \$5,000; statutory, \$1,200).**Library:***Object.*—To maintain a library in Washington; supervise station libraries; prepare indexes and bibliographic lists of meteorological and allied literature; translate correspondence in foreign languages; conduct promotion examinations. Practically all of the knowledge on the science of meteorology and allied sciences from its inception down to the present time is made readily accessible through this library to the scientific and other employees of the Government and the public generally.*Cooperation.*—Governments of Canada, England, France, Germany, and various meteorological and scientific societies of the United States and foreign countries.*Location.*—Washington, D. C.*Date begun.*—1891.*Assignment.*—C. F. Talman.*Proposed expenditures, 1914-15.*—\$8,680 (general expenses, \$2,600; statutory, \$6,080).**Printing:***Object.*—To publish the Monthly Weather Review and other general publications, print blanks, forms, map bases, cards, franks, and central office and station instructions.*Location.*—Washington, D. C.*Date begun.*—1891.*Assignment.*—R. Seyboth.*Proposed expenditures, 1914-15.*—\$15,950 (general expenses, \$8,750; statutory, \$7,200).**Total, General Administration,** \$206,360 (general expenses, \$52,360; statutory, \$154,000).**THE WASHINGTON STATION.****The Washington Station:***Object.*—To observe and record weather conditions in Washington; chart and study telegraphic reports of weather conditions in the Northern Hemisphere; issue forecasts and frost, cold-wave, flood, storm, small-craft, and hurricane warnings; disseminate meteorological and climatological information by telegraph, telephone, maps, cards, and bulletins; investigate the problems of forecasting weather conditions, the hydraulic problems of the flow of rivers, atmospheric physics, and other problems of meteorology, climatology, and seismology; and inspect stations within the district comprised within the activities of the Washington station.*Cooperation.*—Governments of Canada, England, France, Germany, Denmark, and Russia; Smithsonian Institution; University of Pittsburgh; Alaska Agricultural Experiment Station; Bureau of Fisheries; Geological Survey.*Location.*—Washington, D. C.*Date begun.*—1891.*Assignment.*—H. E. Williams, E. H. Bowie, H. Frankenfield, A. J. Henry, P. C. Day, W. J. Humphreys, T. T. Moore, and R. Seyboth.*Proposed expenditures, 1914-15.*—\$159,030 (general expenses, \$95,640; statutory, \$63,390).**Total, Central Office,** \$365,390 (general expenses, \$148,000; statutory, \$217,390).

**WEATHER BUREAU STATIONS OUTSIDE OF WASHINGTON.****GENERAL STATEMENT OF THE WORK.**

The Weather Bureau maintains about 200 regular stations outside of Washington, occupying quarters in Federal buildings, rented quarters, or special buildings erected for the purpose by the department. These stations are manned by trained commissioned officials and assistants who devote their whole time to the Weather Bureau work. Coordinated and related to these principal stations there are also maintained over 4,000 cooperative, special meteorological, and other minor stations, each of which is provided with a very simple set of instruments installed, as a rule, at the residence of the observer, who gives but a few minutes of his time each day to the work. With very few exceptions no quarters are provided or rents paid, and the services are rendered gratuitously, except in some cases where the observers receive from \$5 to not to exceed \$25 per month. The activities at the 200, more or less, principal stations are similar in all respects to the activities described under the Washington station. All the lines of work are not performed at all the stations, nor are the same lines of work conducted at each and every station. The work, which is comprised in general under the following heads, is briefly described below:

*Meteorological observations.*—The taking, recording, enciphering, telegraphing, compiling, and tabulating of regular meteorological observations, and the care and maintenance of the instrumental equipment therefor.

*Daily weather forecasts.*—The preparing of daily weather forecasts, including frost and cold-wave warnings; also the printing of same or issuance by other means and dissemination by maps, bulletins, telegraph and telephone messages; and press reports of weather synopses, forecasts, and full and complete information concerning the current local weather conditions in all their phases.

*Storm, small-craft, and hurricane warnings.*—Storm, small-craft, and hurricane warnings disseminated at coast, Gulf, West Indies, and Great Lake stations; chiefly the distribution of such warnings and the giving out of related information through the medium of coordinated display substations and by means of printed cards, telephone messages, and otherwise.

*Climatological and crop reports.*—The climatological and crop reporting service comprises the collection during the crop season, from April 16 to October 3, of daily telegraphic reports from selected substations organized into services, reporting in the interests of cotton, corn, wheat, sugar, rice, tobacco, fruit, and other standard crops; includes the printing and the prompt dissemination of the information to the public, to commercial exchanges, and to all parties and organizations interested in or benefited by the service that can be promptly reached by the usual means of communication available.

*River and flood warning service.*—The river and flood warning service comprises the maintenance of substations which observe and report rainfall, river stages, and like conditions, and the dissemination of flood information to the public, and especially to the parties and interests most directly benefited thereby.

*Educational work.*—Educational work comprises lectures and courses of instruction in meteorology given by Weather Bureau officials, often according to definite schemes of cooperation between universities, colleges, and other educational institutions, and the local representatives of the Weather Bureau. In several cases the Weather Bureau occupies quarters in the institution concerned, or its office building is located on the university campus. The services are rendered in most cases without additional compensation to the Weather Bureau official, but in some cases a nominal honorarium is tendered by the institution, and the services are performed without interference with the station work. No direct expenditure of Government funds is involved in any case.

*Investigations and research.*—(a) General meteorology and climatology: Many station officials are engaged upon continuing studies carried on intermittently in general meteorology and climatology, weather forecasting, river and flood work, and frost-warning work as affecting and contributing to the protection of various standard crops and other allied scientific studies and investigations. (b) Aerology: Investigations in aerology are conducted only at Fort Omaha, Nebr., except occasional balloon ascensions for specific purposes. Comprises the study of upper air conditions by means of kites and balloons for the purpose of fixing the general meteorological data in the whole atmospheric mass. The results thus far obtained disclose conditions of temperature, pressure, water vapor, and wind in this region that are of great value and importance in the study of dynamic meteorology. The cost of this work is stated under the Fort Omaha station. (c) Solar radiation: Investigations in solar radiation are conducted chiefly at Mount Weather, Va., and incidentally at Madison, Wis.,

Lincoln, Nebr., and Santa Fe, N. Mex., and the costs are stated in the expenditures listed under these stations. Accurate measurements of the heat that is obviously continuously received, day by day, from the sun and its possible variations is the fundamental datum of all physical meteorology, since the heat from the sun is the primary source of all weather phenomena. This element is now subject to daily measurements; the improvement and extension of the observations are going forward steadily.

## DISTRIBUTION OF WORK BY STATIONS.

| Location.                           | Character of work.  | Cooperation.  | Date begun. | Assignment.              | Proposed expenditures, 1914-15. |
|-------------------------------------|---|---|-------------|--------------------------|---------------------------------|
| Abilene, Tex.....                   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1885        | William H. Green.        | \$2,300                         |
| Albany, N. Y.....                   | Meteorological observations and reports, daily weather forecasts, river and flood work.                                   | .....   | 1873        | George T. Todd...        | 7,100                           |
| Alpena, Mich.....                   | Meteorological observations and reports, daily weather forecasts, and maintenance of United States telegraph line.        | .....   | 1872        | Frank Jermin....         | 4,200                           |
| Amarillo, Tex.....                  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1892        | Thomas J. Considine.     | 2,000                           |
| Anniston, Ala.....                  | do.....   | .....   | 1905        | Robert M. Williamson.    | 1,700                           |
| Asheville, N. C.....                | do.....   | .....   | 1902        | Thomas R. Taylor         | 3,500                           |
| Atlanta, Ga. (section center).      | Meteorological observations and reports, daily weather forecasts, river and flood work, and climatological and crop work. | .....   | 1878        | Charles F. von Herrmann. | 12,000                          |
| Atlantic City, N. J.                | Meteorological observations and reports and daily weather forecasts.  | .....   | 1873        | Levi A. Judkins..        | 2,800                           |
| Augusta, Ga.....                    | Meteorological observations and reports, daily weather forecasts, river and flood work, and climatological and crop work. | .....   | 1870        | Eugene D. Emigh.         | 5,620                           |
| Baker, Oreg.....                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1911        | Ralph C. Mize.....       | 1,420                           |
| Baltimore, Md. (section center).    | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and educational work.     | Bureau of Entomology, Bureau of Plant Industry, Johns Hopkins University, Maryland Agricultural College, and U. S. Naval Academy. | 1871        | Oliver L. Fassig...      | 7,540                           |
| Bentonville, Ark..                  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1906        | Orin Parker.....         | 1,700                           |
| Binghamton, N. Y.                   | Meteorological observations and reports, daily weather forecasts, and river and flood work.                               | .....   | 1896        | John R. Weeks....        | 4,890                           |
| Birmingham, Ala..                   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1903        | Edgar C. Horton..        | 4,790                           |
| Bismarck, N. Dak. (section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop work, river and flood work.     | University of North Dakota.   | 1874        | Orris W. Roberts..       | 6,140                           |
| Block Island, R. I.                 | Meteorological observations and reports, daily weather forecasts, and maintenance of seacoast telegraph line.             | .....   | 1880        | George W. Eddey.         | 2,650                           |

*Distribution of work by stations—Continued.*

| Location.                                 | Character of work.   | Cooperation.  | Date begun. | Assignment.        | Proposed expenditures, 1914-15. |
|---|--|---|-------------|--------------------|---------------------------------|
| Boise, Idaho (section center).            | Meteorological observations and reports, daily weather forecasts, climatological and crop work, educational work.                                  | Forest Service, Reclamation Service, Idaho Experiment Station, and University of Idaho.   | 1898        | Edward L. Wells.   | \$7,900                         |
| Boston, Mass. (section center).           | .....do.....   | Blue Hill Observatory, Connecticut Experiment Station, Dartmouth College, Geological Survey, Fish Commission, Massachusetts Experiment Station, Maine Experiment Station, New Hampshire Experiment Station, and Williams College. | 1870        | John W. Smith...   | 18,000                          |
| Buffalo, N. Y. ....                       | Meteorological observations and reports, daily weather forecasts, and educational work.  | Canisius College.   | 1870        | David Cuthbertson  | 12,280                          |
| Burlington, Vt. ....                      | .....do.....   | University of Vermont.  | 1906        | John K. Hooper...  | 4,600                           |
| Cairo, Ill. ....                          | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....   | 1871        | Robert T. Lindley. | 5,200                           |
| Canton, N. Y. ....                        | Meteorological observations and reports and daily weather forecasts.   | .....   | 1906        | John S. Hazen....  | 2,580                           |
| Cape Henry, Va. ....                      | Meteorological observations and reports, daily weather forecasts, maintenance of seacoast telegraph line, and vessel reporting.                    | .....   | 1873        | John F. Newsom..   | 6,880                           |
| Charles City, Iowa.                       | Meteorological observations and reports and daily weather forecasts.   | .....   | 1904        | Hal P. Hardin....  | 2,150                           |
| Charleston, S. C. ....                    | Meteorological observations and reports, daily weather forecasts, river and flood work, and climatological and crop work.                          | .....   | 1871        | James H. Scott.... | 7,200                           |
| Charlotte, N. C. ....                     | Meteorological observations and reports and daily weather forecasts.   | .....   | 1878        | Ora O. Atto.....   | 3,200                           |
| Chattanooga, Tenn.                        | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....   | 1879        | Lewis M. Pindell.. | 7,200                           |
| Cheyenne, Wyo. (section center).          | Meteorological observations and reports, daily weather forecasts, climatological and crop service, and educational work.                           | War Department, Forest Service, Reclamation Service, Wyoming Experiment Station, and University of Wyoming.   | 1870        | Robert Q. Grant..  | 6,280                           |
| Chicago, Ill. (district forecast center). | Meteorological observations and reports, daily weather forecasts, climatological work, crop work, and maintenance of United States telegraph line. | .....   | 1870        | Henry J. Cox.....  | 61,000                          |

*Distribution of work by stations—Continued.*

| Location.   | Character of work.  | Cooperation.   | Date begun. | Assignment.               | Proposed expenditures, 1914-15. |
|---|---|--|-------------|---------------------------|---------------------------------|
| Cincinnati, Ohio...                                   | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....  | 1870        | William C. Devereaux.     | \$20,380                        |
| Cleveland, Ohio...                                    | Meteorological observations and reports, daily weather forecasts, and educational work.   | Case Scientific School.  | 1870        | William H. Alexander.     | 12,600                          |
| Columbia, Mo.<br>(section center).                    | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and educational work.                       | Missouri Experiment Station, University of Missouri, and Westminster College.  | 1889        | George Reeder....         | 4,000                           |
| Columbia, S. C.<br>(section center).                  | Meteorological observations and reports, daily weather forecasts, climatological and crop work, river and flood work, and educational work. | Charleston Museum, Clemson College, and Winthrop College.  | 1887        | Richard H. Sullivan.      | 5,890                           |
| Columbus, Ohio<br>(section center).                   | .....do.....  | Geological Survey, Hiram College, Life-Saving Service, Oberlin College, Ohio State University, Ohio Experiment Station, and Urbana University.     | 1878        | J. Warren Smith..         | 16,660                          |
| Concord, N. H.....                                    | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....  | 1902        | Elisha C. Vose....        | 3,660                           |
| Concordia, Kans...                                    | Meteorological observations and reports and daily weather forecasts.  | .....  | 1885        | John W. Byram..           | 1,780                           |
| Corpus Christi, Tex.                                  | .....do.....  | .....  | 1887        | William F. Lehman.        | 3,880                           |
| Dallas, Tex.....                                      | .....do.....  | .....  | 1913        | Joseph L. Cline...        | 5,890                           |
| Davenport, Iowa..                                     | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....  | 1871        | Julius M. Sherier..       | 5,420                           |
| Dayton, Ohio.....                                     | .....do.....  | .....  | 1911        | Henry F. Alps....         | 6,250                           |
| Del Rio, Tex.....                                     | Meteorological observations and reports and daily weather forecasts.  | .....  | 1905        | William U. Simons         | 1,400                           |
| Denver, Colo. (district forecast and section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop work, river and flood work, and educational work. | Forest Service, Indian Office, Reclamation Service, Colorado Agricultural College, Arkansas Valley Experiment Station, and Colorado State College. | 1871        | Frederick H. Brandenburg. | 25,760                          |
| Des Moines, Iowa<br>(section center).                 | .....do.....  | Iowa College and Experiment Station, Iowa State University, State Weather Service, and Tobin College.  | 1878        | George M. Chappel         | 6,930                           |
| Detroit, Mich.....                                    | Meteorological observations and reports and daily weather forecasts.  | .....  | 1870        | Norman B. Conger.         | 9,980                           |

*Distribution of work by stations—Continued.*

| Location.                             | Character of work.  | Cooperation   | Date begun. | Assignment.             | Proposed expenditures, 1914-15. |
|---------------------------------------|---|---|-------------|-------------------------|---------------------------------|
| Devils Lake, N. Dak.                  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1904        | Martin R. Hovde..       | \$1,900                         |
| Dodge City, Kans..                    | do.....   | .....   | 1874        | Harrison McP. Baldwin.  | 1,860                           |
| Dubuque, Iowa....                     | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....   | 1873        | James H. Spencer.       | 6,020                           |
| Duluth, Minn.....                     | Meteorological observations and reports and daily weather forecasts.  | .....   | 1870        | Herbert W. Richardson.  | 6,780                           |
| Eastport, Me.....                     | do.....   | .....   | 1873        | Daniel C. Murphy..      | 2,340                           |
| Elkins, W. Va.....                    | do.....   | .....   | 1889        | Harris A. Jones....     | 2,790                           |
| El Paso, Tex.....                     | do.....   | .....   | 1878        | Nathan D. Lane....      | 3,890                           |
| Erie, Pa.....                         | do.....   | .....   | 1873        | Harry O. Geren....      | 5,530                           |
| Escanaba, Mich....                    | do.....   | .....   | 1898        | Vincent E. Jakl....     | 2,890                           |
| Eureka, Cal.....                      | do.....   | .....   | 1886        | Aaron H. Bell.....      | 2,300                           |
| Evansville, Ind....                   | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....   | 1897        | Albert Brand.....       | 5,480                           |
| Fort Omaha, Nebr.                     | Investigations in aerology...   | .....   | 1914        | W. R. Blair.....        | 17,600                          |
| Fort Smith, Ark....                   | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....   | 1882        | Leon J. Guthrie....     | 4,860                           |
| Fort Wayne, Ind...                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1911        | Walter S. Palmer..      | 5,990                           |
| Fort Worth, Tex...                    | do.....   | Bureau of Plant Industry.   | 1898        | Dennis S. Landis..      | 4,900                           |
| Fresno, Cal.....                      | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....   | 1887        | Walter E. Bonnett       | 5,820                           |
| Galveston, Tex....                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1871        | William P. Stewart.     | 5,400                           |
| Grand Haven, Mich.                    | do.....   | .....   | 1905        | William J. Schnurbusch. | 2,480                           |
| Grand Junction, Colo.                 | do.....   | .....   | 1899        | Fsek S. Nichols...      | 6,220                           |
| Grand Rapids, Mich. (section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop work, river and flood work, and educational work. | Bureau of Plant Industry, Life-Saving Service, Michigan Experiment Station, and University of Michigan. | 1903        | Charles F. Schneider.   | 8,240                           |
| Green Bay, Wis....                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1886        | Frederick W. Conrad.    | 3,150                           |
| Hannibal, Mo.....                     | Meteorological observations and reports, daily weather forecasts, and river and flood work.   | .....   | 1892        | Bion L. Waldron..       | 3,490                           |
| Harrisburg, Pa....                    | do.....   | .....   | 1888        | Edward R. De-main.      | 5,060                           |
| Hartford, Conn....                    | do.....   | .....   | 1904        | William W. Neifert.     | 6,290                           |
| Hatteras, N. C....                    | Meteorological observations and reports, daily weather forecasts, and maintenance of seacoast telegraph line.                               | .....   | 1874        | Charles E. Wilson..     | 1,880                           |
| Havre, Mont.....                      | Meteorological observations and reports and daily weather forecasts.  | .....   | 1892        | Charles W. Ling..       | 1,920                           |

*Distribution of work by stations—Continued.*

| Location.                               | Character of work.  | Cooperation.   | Date begun. | Assignment.              | Proposed expenditures, 1914-15. |
|---|---|--|-------------|--------------------------|---------------------------------|
| Helena, Mont.<br>(section center).      | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and educational work.     | Reclamation Service, Forest Service, Montana Agricultural College, Montana State University, and Montana Experiment Station. | 1880        | R. Frank Young..         | \$8,880                         |
| Honolulu, Hawaii,<br>(section center).  | Meteorological observations and reports, daily weather forecasts, and climatological and crop work.                       | .....  | 1904        | William B. Stockman.     | 5,400                           |
| Houghton, Mich.                         | Meteorological observations and reports and daily weather forecasts.  | .....  | 1900        | Howard B. Cowdick.       | 3,800                           |
| Houston, Tex.<br>(section center).      | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and river and flood work. | .....  | 1909        | Bernard Bunne-<br>meyer. | 16,690                          |
| Huron, S. Dak.<br>(section center).     | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and educational work.     | Forest Service, Indian Office, Reclamation Service, and South Dakota Experiment Station.                                     | 1881        | Samuel W. Glenn.         | 5,850                           |
| Indianapolis, Ind.<br>(section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and river and flood work. | Notre Dame University, Indiana Experiment Station, and St. Joseph's College.   | 1871        | Verne H. Church..        | 15,460                          |
| Iola, Kans. ....                        | Meteorological observations and reports, daily weather forecasts, and river and flood work.                               | .....  | 1905        | Howard K. Holcomb.       | 2,190                           |
| Ithaca, N. Y. (section center).         | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and educational work.     | Life Saving Service, Cornell University, Ranger School, New York Experiment Station, and West Point Military Academy.        | 1887        | Wilford M. Wilson.       | 6,920                           |
| Jacksonville, Fla.<br>(section center). | .....do.....  | Bureau of Plant Industry, Forest Service, Coast and Geodetic Survey, and University of Florida.                              | 1871        | Alexander J. Mitchell.   | 10,570                          |
| Kalispell, Mont....                     | Meteorological observations and reports and daily weather forecasts.  | .....  | 1899        | Harvey B. Dick...        | 1,940                           |
| Kansas City, Mo...                      | Meteorological observations and reports, daily weather forecasts, climatological and crop work, and river and flood work. | .....  | 1888        | Patrick Connor....       | 12,690                          |
| Keokuk, Iowa.....                       | Meteorological observations and reports, daily weather forecasts, and river and flood work.                               | .....  | 1871        | Frederic Z. Gosewisch.   | 2,520                           |

*Distribution of work by stations--Continued.*

| Location.                           | Character of work.   | Cooperation.   | Date begun. | Assignment.          | Proposed expenditures, 1914-15. |
|-------------------------------------|--|--|-------------|----------------------|---------------------------------|
| Key West, Fla....                   | Meteorological observations and reports, daily weather forecasts, maintenance of seacoast telegraph line, and vessel reporting.                          | .....  | 1870        | Harry B. Boyer...    | 9,050                           |
| Knoxville, Tenn...                  | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....  | 1871        | John F. Voorhees..   | 6,290                           |
| La Crosse, Wis. ....                | .....do.....   | .....  | 1872        | Edwin C. Thompson.   | 5,290                           |
| Lander, Wyo.....                    | Meteorological observations and reports and daily weather forecasts.   | .....  | 1891        | McLin S. Collom..    | 1,700                           |
| Lansing, Mich.....                  | Meteorological observations and reports, daily weather forecasts, and educational work.  | .....  | 1910        | Dewey A. Seeley..    | 4,480                           |
| Lewiston, Idaho...                  | Meteorological observations and reports and daily weather forecasts.   | .....  | 1900        | Walter W. Thomas     | 3,070                           |
| Lexington, Ky....                   | .....do.....   | .....  | 1893        | George B. Wurtz..    | 3,290                           |
| Lincoln, Nebr. (section center).    | Meteorological observations and reports, daily weather forecasts, climatological and crop work, investigations in solar radiation, and educational work. | Forest Service, Reclamation Service, University of Nebraska, and Doane College.                | 1897        | George A. Loveland.  | 8,310                           |
| Little Rock, Ark. (section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work.                        | Reclamation Service and Arkansas Agricultural Experiment Station.                              | 1879        | Henry F. Alciantore. | 10,690                          |
| Los Angeles, Cal...                 | Meteorological observations and reports, daily weather forecasts, and educational work.  | University of California.  | 1877        | Ford A. Carpenter    | 10,670                          |
| Louisville, Ky. (section center).   | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work.                        | Kentucky Experiment Station, Bethlehem Academy, University of Louisville, and Loretto Academy. | 1871        | Ferdinand J. Walz    | 12,980                          |
| Ludington, Mich..                   | Meteorological observations and reports and daily weather forecasts.   | .....  | 1912        | Charles S. Wood..    | 3,100                           |
| Lynchburg, Va....                   | .....do.....   | .....  | 1871        | George N. Wilson..   | 3,581                           |
| Macon, Ga.....                      | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....  | 1899        | William A. Mitchell. | 4,030                           |
| Madison, Wis.....                   | Meteorological observations and reports, daily weather forecasts, investigations in solar radiation, and educational work.                               | University of Wisconsin.   | 1904        | Erie R. Miller.....  | 4,190                           |
| Marquette, Mich...                  | Meteorological observations and reports and daily weather forecasts.   | .....  | 1871        | Henry R. Patrick..   | 3,200                           |
| Memphis, Tenn....                   | Meteorological observations and reports, daily weather forecasts, and climatological and crop and river and flood work.                                  | .....  | 1871        | Samuel C. Emery..    | 8,540                           |
| Meridian, Miss....                  | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....  | 1889        | James H. Jaqua...    | 4,480                           |
| Miami, Fla.....                     | Meteorological observations and reports and daily weather forecasts.   | .....  | 1911        | Richard W. Gray..    | 3,800                           |

*Distribution of work by stations—Continued.*

| Location.   | Character of work.  | Cooperation.  | Date begun. | Assignment.              | Proposed expenditures, 1914-15. |
|---|---|---|-------------|--------------------------|---------------------------------|
| Milwaukee, Wis.<br>(section center).                        | Meteorological observations and reports, daily weather forecasts, climatological and crop and educational work.                   | Wisconsin Experiment Station, Carroll College, North Wisconsin Academy, Smith Observatory, and Ripon College. | 1870        | Henry B. Hersey..        | 12,870                          |
| Minneapolis, Minn.<br>(section center).                     | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | University of Minnesota.  | 1890        | Ulysses G. Pursell.      | 11,560                          |
| Mobile, Ala.....  | Meteorological observations and reports, daily weather forecasts, climatological and crop and river and flood work.               | .....   | 1870        | Albert Ashenberger.      | 6,790                           |
| Modena, Utah.....   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1901        | William H. Hossler.      | 2,050                           |
| Montgomery, Ala.<br>(section center).                       | Meteorological observations and reports, daily weather forecasts, climatological and crop and river and flood work.               | Tuskegee Institute.   | 1872        | Patrick H. Smyth.        | 8,540                           |
| Mount Weather,<br>Va.                                       | Meteorological observations and reports, daily weather forecasts, and aerial and magnetic investigations.                         | .....   | 1904        | Herbert H. Kimball.      | 9,120                           |
| Nantucket, Mass..   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1886        | George E. Grimes.        | 2,250                           |
| Narragansett Pier,<br>R. I.                                 | do.....   | .....   | 1882        | Mrs. Margaret E. Conway. | 1,500                           |
| Nashville, Tenn.<br>(section center).                       | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Tennessee Experiment Station and University of the South.   | 1870        | Roscoe Nunn.....         | 11,000                          |
| New Haven, Conn.  | Meteorological observations and reports, daily weather forecasts, and educational work.   | Yale University.  | 1872        | Leonard M. Tarr..        | 7,580                           |
| New Orleans, La.<br>(district forecast and section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Bureau of Entomology, Loyola College, St. Charles College, and Louisiana Experiment Station.                  | 1870        | Isaac M. Cline.....      | 32,980                          |
| New York, N. Y...   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1870        | James H. Searr...        | 35,560                          |
| Norfolk, Va. ....   | do.....   | .....   | 1871        | William G. Burns.        | 9,950                           |
| Northfield, Vt.....   | Meteorological observations and reports, daily weather forecasts, and educational work.   | Norwich University.   | 1887        | William A. Shaw..        | 3,860                           |
| North Head, Wash.   | Meteorological observations and reports, weather forecasts, and maintenance of seacoast telegraph line.                           | .....   | 1902        | John J. Kelliher...      | 1,570                           |
| North Platte, Nebr  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1874        | Alphonso W. Shilling.    | 2,770                           |
| Oklahoma, Okla.<br>(section center).                        | Meteorological observations and reports, daily weather forecasts, climatological and crop and educational work.                   | Forest Service, Indian Office, and University of Oklahoma.  | 1890        | J. Pemberton Slaughter.  | 10,090                          |
| Omaha, Nebr.....  | Meteorological observations and reports, daily weather forecasts, climatological and crop and river and flood work.               | .....   | 1870        | Lucius A. Welsh..        | 8,590                           |

*Distribution of work by stations—Continued.*

| Location.   | Character of work.  | Cooperation.   | Date begun. | Assignment.               | Proposed expenditures, 1914-15. |
|---|---|--|-------------|---------------------------|---------------------------------|
| Oswego, N. Y. ....                                      | Meteorological observations and reports and daily weather forecasts.  | .....  | 1870        | Julius G. Linsley..       | \$2,100                         |
| Palestine, Tex. ....                                    | .....do.....  | .....  | 1881        | Louis Dorman....          | 2,500                           |
| Parkersburg, W. Va. (section center).                   | Meteorological observations and reports, daily weather forecasts, climatological and crop and river and flood work.               | .....  | 1881        | Henry C. Howe...          | 5,450                           |
| Pensacola, Fla. ....                                    | Meteorological observations and reports and daily weather forecasts.  | .....  | 1879        | William F. Reed, jr.      | 5,520                           |
| Peoria, Ill. ....                                       | Meteorological observations and reports, daily weather forecasts, and educational work.   | Bradley Polytechnic Institute.   | 1905        | Merton L. Fuller..        | 5,460                           |
| Philadelphia, Pa. (section center).                     | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Life-Saving Service, Moravian Parochial School, and Pennsylvania State College.  | 1871        | George S. Bliss....       | 15,800                          |
| Phoenix, Ariz. (section center).                        | .....do.....  | Bureau of Plant Industry, Forest Service, Bureau of Entomology, Coast and Geodetic Survey, Indian Office, Reclamation Service, and Arizona Experiment Station. | 1895        | Robert R. Briggs..        | 5,580                           |
| Pierre, S. Dak. ....                                    | Meteorological observations and reports and daily weather forecasts.  | .....  | 1891        | Edwin E. Row...           | 1,530                           |
| Pittsburgh, Pa. ....                                    | Meteorological observations and reports, daily weather forecasts, and river and flood work.                                       | .....  | 1870        | Henry Pennywitt.          | 14,490                          |
| Pocatello, Idaho...                                     | Meteorological observations and reports and daily weather forecasts.  | .....  | 1899        | Arthur R. Teeple..        | 1,760                           |
| Port Crescent, Wash.                                    | Meteorological observations and reports, daily weather forecasts, maintenance of seacoast telegraph line, and vessel reporting.   | .....  | 1898        | Leon G. Sutton...         | 10,820                          |
| Port Huron, Mich..                                      | Meteorological observations and reports and daily weather forecasts.  | .....  | 1874        | Abe Wiesner.....          | 2,630                           |
| Portland, Me. ....                                      | Meteorological observations and reports, daily weather forecasts, and river and flood work.                                       | .....  | 1871        | Edward P. Jones..         | 5,890                           |
| Portland, Oreg. (district forecast and section center). | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Forest Service, Geological Survey, Life Saving Service, Reclamation Service, Oregon, Agricultural College, and Oregon Experiment Station.                      | 1871        | Edward A. Beals..         | 36,480                          |
| Providence, R. I. ...                                   | Meteorological observations and reports and daily weather forecasts.  | Ladd Observatory.  | 1904        | Eben H. Emery ..          | 7,190                           |
| Pueblo, Colo. ....                                      | .....do.....  | .....  | 1888        | Lawrence H. Daingerfield. | 4,290                           |
| Raleigh, N. C. (section center).                        | Meteorological observations and reports, daily weather forecasts, climatological and crop and river and flood work.               | North Carolina Experiment Station.   | 1884        | Lee A. Denson....         | 11,080                          |

*Distribution of work by stations—Continued.*

| Location.   | Character of work   | Cooperation.  | Date begun. | Assignment.           | Proposed expenditures, 1914-15. |
|---|---|---|-------------|-----------------------|---------------------------------|
| Rapid City, S. Dak.   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1888        | George V. Sager...    | \$1,630                         |
| Reading, Pa. ....   | .....do.....  | .....   | 1912        | Cornelius J. Doherty. | 4,780                           |
| Red Bluff, Cal. ....  | .....do.....  | .....   | 1877        | Noble M. Cunningham.  | 2,860                           |
| Reno, Nev. (section center).                                | Meteorological observations and reports, daily weather forecasts, and climatological and crop work.                               | Forest Service, Reclamation Service, and Nevada Experiment Station.   | 1905        | Harvey S. Cole...     | 6,060                           |
| Richmond, Va. (section center).                             | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Virginia Experiment Station, Leander McCormick Observatory, Normal and Agricultural Institute, Virginia Military Institute, and Norfolk & Western Ry. Experiment Station. | 1897        | Edward A. Evans.      | 8,290                           |
| Rochester, N. Y. ...  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1870        | Luther M. Dey...      | 4,680                           |
| Roseburg, Oreg. ....  | .....do.....  | .....   | 1877        | William Bell. ....    | 2,580                           |
| Rosewell, N. Mex. ....                                      | .....do.....  | .....   | 1904        | Marsden Wright. .     | 1,530                           |
| Sacramento, Cal. ....                                       | Meteorological observations and reports, daily weather forecasts, and river and flood work.                                       | .....   | 1877        | Nathaniel R. Taylor.  | 5,490                           |
| Saginaw, Mich. ....   | Meteorological observations and reports, daily weather forecasts, and river and flood and educational work.                       | Arthur Hill Trade School.   | 1912        | Frank H. Coleman      | 3,530                           |
| St. Joseph, Mo. ....  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1910        | William S. Belden.    | 5,080                           |
| St. Louis, Mo. ....   | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | St. Louis University.   | 1870        | Montrose W. Hayes.    | 22,000                          |
| St. Paul, Minn. ....  | Meteorological observations and reports and daily weather forecasts.  | .....   | 1870        | John N. Ryker....     | 5,520                           |
| Salt Lake City, Utah (section center).                      | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Bureau of Plant Industry, Forest Service, Reclamation Service, Utah Experiment Station, and University of Utah.   | 1874        | Alfred H. Thiessen    | 13,910                          |
| San Antonio, Tex.   | Meteorological observations and reports and daily weather forecasts.  | .....   | 1885        | Allen Buell.....      | 6,050                           |
| San Diego, Cal. ....  | .....do.....  | .....   | 1871        | E. Herbert Nimmo      | 4,840                           |
| Sandusky, Ohio. ....  | .....do.....  | .....   | 1877        | Claude C. Cooper..    | 4,630                           |
| Sandy Hook, N. J.   | Station not yet opened.   | .....   | .....       | (Not yet selected)    | 9,590                           |
| San Francisco, Cal. (district forecast and section center). | Meteorological observations and reports, daily weather forecasts, educational work, and maintenance of seacoast telegraph line.   | Bureau of Plant Industry, Bureau of Entomology, Forest Service, Geological Survey, Chabot Observatory, and Santa Clara College.   | 1871        | George H. Willson     | 42,490                          |

*Distribution of work by stations—Continued.*

| Location.                                      | Character of work.   | Cooperation.   | Date begun. | Assignment.          | Proposed expenditures, 1914-15. |
|--|--|--|-------------|----------------------|---------------------------------|
| San Jose, Cal. ....                            | Meteorological observations and reports and daily weather forecasts.   | .....  | 1905        | Maurice Connell..    | \$1,640                         |
| San Juan, P. R.,<br>W. I. (section<br>center). | Meteorological observations and reports, daily weather forecasts, and climatological and crop work.  | Porto Rico Experiment Station and Irrigation Service.  | 1898        | F. Eugene Hartwell.  | 3,340                           |
| San Luis Obispo,<br>Cal.                       | Meteorological observations and reports and daily weather forecasts.   | .....  | 1894        | John R. Williams.    | 1,670                           |
| Santa Fe, N. Mex.<br>(section center).         | Meteorological observations and reports, daily weather forecasts, climatological and crop investigations in solar radiation, and educational work. | Forest Service, Reclamation Service, New Mexico Agricultural College, New Mexico Experiment Station, and Rio Grande Industrial School.   | 1871        | Charles E. Linney.   | 5,250                           |
| Sault Ste. Marie,<br>Mich.                     | Meteorological observations and reports and daily weather forecasts.   | .....  | 1877        | Alexander G. Burns.  | 3,670                           |
| Savannah, Ga. ....                             | Meteorological observations and reports, daily weather forecasts, and climatological and crop work.  | .....  | 1871        | Charles M. Strong.   | 8,320                           |
| Scranton, Pa. ....                             | Meteorological observations and reports and daily weather forecasts.   | .....  | 1900        | William M. Dudley.   | 4,990                           |
| Seattle, Wash.<br>(section center).            | Meteorological observations and reports, daily weather forecasts, climatological and crop and educational work.                                    | Bureau of Plant Industry, Forest Service, Agricultural College, Bureau of Fisheries, Life-Saving Service, Reclamation Service, Washington Experiment Station, and Washington State University. | 1893        | George N. Salisbury. | 13,740                          |
| Sheridan, Wyo. ....                            | Meteorological observations and reports and daily weather forecasts.   | .....  | 1907        | Harry A. Frise....   | 1,870                           |
| Shreveport, La. ....                           | Meteorological observations and reports, daily weather forecasts, and river and flood work.  | .....  | 1871        | James W. Cronk..     | 4,580                           |
| Sioux City, Iowa..                             | .....do.....   | .....  | 1889        | Gilbert W. McDowall. | 3,520                           |
| Spokane, Wash. ....                            | Meteorological observations and reports and daily weather forecasts.   | .....  | 1881        | Charles Stewart...   | 5,490                           |
| Springfield, Ill.<br>(section center).         | Meteorological observations and reports, daily weather forecasts, climatological and crop and educational work.                                    | Blackburn College, Ewing College, Illinois State Normal University, Elgin Observatory, and University of Illinois.   | 1879        | Clarence J. Root..   | 8,110                           |

*Distribution of work by stations—Continued.*

| Location.                             | Character of work.  | Cooperation.  | Date begun. | Assignment.           | Proposed expenditures, 1914-15. |
|---------------------------------------|---|---|-------------|-----------------------|---------------------------------|
| Springfield, Mo....                   | Meteorological observations and reports, daily weather forecasts, and educational work.   | Drury College.  | 1887        | Walter B. Hare...     | \$1,020                         |
| Syracuse, N. Y....                    | .....do.....  | State College of Forestry and Syracuse University.          | 1902        | Morgan R. Sanford     | 4,420                           |
| Tacoma, Wash....                      | Meteorological observations and reports and daily weather forecasts.  | .....   | 1897        | Louis C. Cover....    | 4,620                           |
| Tampa, Fla. ....                      | .....do.....  | .....   | 1890        | Walter J. Bennett.    | 5,050                           |
| Tatoosh Island, Wash.                 | Meteorological observations and reports, daily weather forecasts, maintenance of seacoast telegraph line, and vessel reporting.   | .....   | 1902        | John E. Hissong..     | 2,930                           |
| Taylor, Tex. ....                     | Meteorological observations and reports and daily weather forecasts.  | .....   | 1901        | Herbert Tullsen...    | 2,880                           |
| Terre Haute, Ind..                    | Meteorological observations and reports, daily weather forecasts, and river and flood work.                                       | .....   | 1912        | William R. Cade..     | 5,890                           |
| Thomasville, Ga...                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1905        | Olin M. Hadley...     | 2,270                           |
| Toledo, Ohio.....                     | Meteorological observations and reports and daily weather forecasts.  | .....   | 1870        | William S. Currier    | 5,880                           |
| Tonopah, Nev.....                     | .....do.....  | .....   | 1906        | Joseph C. Piercy...   | 2,880                           |
| Topeka, Kans. (section center).       | Meteorological observations and reports, daily weather forecasts, climatological and crop and educational work.                   | Kansas Agricultural College and Kansas Wesleyan University. | 1887        | Thorp B. Jennings     | 5,210                           |
| Trenton, N.J. (section center).       | .....do.....  | New Jersey Agricultural College and Experiment Station.     | 1913        | G. Harold Noyes..     | 4,870                           |
| Valentine, Nebr...                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1885        | Charles E. Faulhaber. | 1,880                           |
| Vicksburg, Miss. (section center).    | Meteorological observations and reports, daily weather forecasts, climatological and crop, river and flood, and educational work. | Agricultural College and University of Mississippi.         | 1871        | William E. Barron.    | 8,150                           |
| Wagon Wheel Gap, Colo.                | Meteorological observations and reports and climatological work.  | Forest service.   | 1910        | Thomas A. Blair..     | 3,780                           |
| Walla Walla, Wash.                    | .....do.....  | .....   | 1885        | Charles C. Garrett.   | 3,180                           |
| Wichita, Kans....                     | Meteorological observations and reports, daily weather forecasts, and river and flood work.                                       | .....   | 1888        | Samuel P. Peterson.   | 4,580                           |
| Williston, N.Dak..                    | Meteorological observations and reports and daily weather forecasts.  | .....   | 1893        | John Craig.....       | 1,950                           |
| Wilmington, N. C.                     | Meteorological observations and reports, daily weather forecasts, and climatological and crop work.                               | .....   | 1871        | George W. Felger..    | 4,200                           |
| Winnemucca, Nev.                      | Meteorological observations and reports and daily weather forecasts.  | .....   | 1884        | Ray L. Fisher....     | 1,910                           |
| Wytheville, Va....                    | .....do.....  | .....   | 1902        | James I. Widmeyer     | 2,070                           |
| Yankton, S. Dak..                     | .....do.....  | .....   | 1873        | William H. Fallow     | 1,880                           |
| Yellowstone Park, Wyo.                | .....do.....  | .....   | 1903        | William D. Maxwell.   | 2,780                           |
| Yuma, Ariz. ....                      | .....do.....  | .....   | 1875        | Sumner Hackett..      | 1,640                           |
| <b>Total Weather Bureau Stations.</b> | .....   | .....   | .....       | .....                 | <b>1,301,880</b>                |

## BUREAU OF ANIMAL INDUSTRY.

### ADMINISTRATION.

#### General Bureau Administration:

*Object.*—Supervision of the bureau activities and the performance of such duties as may be common to the bureau as a whole, the cost of which can not be readily prorated against the various projects involved, such as accounting and editorial work, the distribution of supplies, and matters relating to the personnel.

*Location.*—Washington, D. C.

*Date begun.*—1884.

*Assignment.*—A. D. Melvin, J. R. Mohler, C. C. Carroll.

*Proposed expenditures, 1914-15.*—\$125,000 (administrative, \$18,500; statutory, \$94,000; meat inspection, \$12,500).

#### Stores:

*Object.*—To provide for miscellaneous supplies, the use of which is more or less common to the various laboratories and offices of the bureau, and which are purchased from time to time and held in stock to be distributed as may be required in connection with the various projects.

*Location.*—Washington, D. C.

*Date begun.*—1884.

*Assignment.*—A. D. Melvin, J. R. Mohler, C. C. Carroll.

*Proposed expenditures, 1914-15.*—\$30,000 (administrative, \$4,000; dourine, \$1,000; eradicating cattle ticks, \$2,000; meat inspection, \$23,000).

**Total, Administration,** \$155,000 (statutory, \$94,000; dourine, \$1,000; eradicating cattle ticks, \$2,000; administrative, \$22,500; meat inspection, \$35,500).

### MEAT INSPECTION.

#### Supervision:

*Object.*—Supervision of all the work of meat inspection and the performance of duties common to the whole work.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—R. P. Steddom, M. Dorset, J. R. Mohler, B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$51,000 (meat inspection, \$28,000; statutory, \$23,000).

#### Preparation and Distribution of Branding Ink:

*Object.*—To furnish bureau employees engaged in the work of meat inspection with a suitable marking fluid for stamping carcasses of animals inspected and slaughtered under Federal supervision.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—During first 11 months of the fiscal year 1914 there were 4,396 gallons of this ink manufactured and forwarded to bureau stations for marking carcasses of animals.

*Assignment.*—T. M. Price.

*Proposed expenditures, 1914-15.*—\$3,600 (meat inspection, \$3,000; statutory, \$600).

#### Bacteriological Investigations of Meat and Meat-Food Products:

*Object.*—To develop information concerning various phases of preparing meat and meat-food products for human use.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Determination of the cause of ham souring; recommendations for improved methods of curing meats; determination of bacteria in hog carcasses; reports of routine examination of meat samples with regard to wholesomeness.

*Assignment.*—C. N. McBryde.

*Proposed expenditures, 1914-15.*—\$3,500 (meat inspection, \$3,200; statutory, \$300).

#### Investigation of Changes Which Take Place in Meats Placed in Cold Storage:

*Object.*—To ascertain the changes taking place in fresh beef stored at temperatures above freezing; also to develop other information concerning meats in storage.

*Location.*—Washington, D. C., and certain other cities where meat inspection establishments under Government inspection are located.

*Date begun.*—1913.

*Results.*—Indefinite as yet.

*Assignment.*—C. N. McBryde, Ralph Hoagland.

*Proposed expenditures, 1914-15.*—\$5,000 (meat inspection, \$4,800; statutory, \$200).

**Investigation of Canned Meats:**

*Object.*—To develop information concerning the effect which prolonged storage has upon canned meats.

*Location.*—Washington, D. C., and certain cities where meat inspection establishments are operating under supervision of the Federal Government.

*Date begun.*—1909.

*Results.*—Final results incomplete; investigations still under way.

*Assignment.*—T. M. Price, C. N. McBryde.

*Proposed expenditures, 1914-15.*—\$4,000 (meat inspection).

**Special Supervisory Inspection:**

*Object.*—To see that the law and regulations and the instructions governing meat inspection are properly observed.

*Location.*—Meat inspection stations throughout United States.

*Date begun.*—Work as organized at the present was begun when the "Meat-inspection act" of June 30, 1906, became effective.

*Results.*—Increased efficiency in the enforcement of the meat-inspection regulations.

*Assignment.*—R. P. Steddom, Geo. Ditlewig, A. J. Pistor.

*Proposed expenditures, 1914-15.*—\$35,700 (meat inspection).

**Purchase of Meat-Inspection Brands:**

*Object.*—These brands are used by the bureau employees for marking carcasses or parts of carcasses of animals slaughtered under Federal supervision, and also for marking containers of meats and meat-food products prepared from such carcasses under Federal supervision. A beef carcass is branded in approximately 19 different places, a hog carcass in approximately 8 places, and sheep, calves, and goats in approximately 4 places each. The inspection legend is applied approximately 800,000,000 times a year.

*Location.*—Brands used in 232 cities and towns, more or less, throughout the United States.

*Date begun.*—1909.

*Assignment.*—R. P. Steddom.

*Proposed expenditures, 1914-15.*—\$6,400 (meat inspection).

**Laboratory Meat Inspection and Investigation of Meats and Meat-Food Products:**

*Object.*—This project is along similar lines to the one conducted at the laboratories at the 6 stations in the field. When samples are examined in the field laboratories and found to contain prohibited substances or found to be improperly labeled, they are forwarded to the Washington laboratory for further consideration.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—During the first 10 months of the fiscal year 1914 approximately 7,500 samples of meats and meat-food products were analyzed.

*Assignment.*—M. Dorset.

*Proposed expenditures, 1914-15.*—\$17,500 (meat inspection).

**Ante-Mortem Inspection of Animals for Slaughter:**

*Object.*—To discover animals which show symptoms of or are suspected of being affected with any disease; to slaughter such animals separately so as to insure a careful examination of same.

*Cooperation.*—In a few cities where this work is conducted there is some cooperation with the local authorities.

*Location.*—152 cities, more or less, throughout the United States.

*Date begun.*—1906.

*Results.*—For the first 10 months of the fiscal year 1914 there were 47,906,276 animals inspected. This is approximately a 2 per cent increase over 1913.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$193,200 (meat inspection, \$186,200; statutory, \$7,000).

**Post-Mortem Inspection of Animals for Human Food:**

*Object.*—To make a careful examination of the carcasses, or parts thereof, of all cattle, sheep, swine, and goats slaughtered at official establishments, to ascertain the presence of any disease which may render them unfit for food.

*Location.*—152 cities, more or less, throughout the United States.

*Date begun.*—1906.

*Results.*—For the first 10 months of the fiscal year 1914 there were 47,841,623 carcasses of animals inspected. This is approximately a 2 per cent increase over 1913.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$1,219,700 (meat inspection, \$1,214,700; statutory, \$5,000).

**Supervision, Preparation, and Distribution of Meats and Meat-Food Products:**

*Object.*—To inspect products out of and into official establishments or departments thereof to see that no unfit meat is used in the various processes of packing, canning, and smoking; to see that the establishments are kept in a sanitary condition, that no deleterious preservatives are used, and that the workers are clean as to person and raiment.

*Location.*—In 227 cities, more or less, throughout the United States.

*Date begun.*—1906.

*Results.*—For the first 10 months of the fiscal year 1914, the products inspected aggregated 8,032,172,959 pounds. As compared with the fiscal year 1913, this shows a decrease of approximately 0.65 per cent.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$1,347,600 (meat inspection, \$1,332,600; statutory, \$15,000).

**Inspecting Meats and Meat-Food Products for the United States Navy:**

*Object.*—To insure that the meat and meat-food products furnished the Navy have been inspected and passed, that they are sound and fit at the time of delivery, and that they conform to the specifications of the Navy Department.

*Cooperation.*—Navy Department.

*Location.*—17 cities, more or less, throughout the United States.

*Date begun.*—1908.

*Results.*—For the first 10 months of the fiscal year 1914, the meats and meat-food products inspected for the United States Navy amounted to 12,678,182 pounds, of which 335,772 pounds were rejected. The quantity inspected was approximately a 25 per cent increase over the fiscal year 1913, and the quantity rejected an increase of approximately 20 per cent.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$6,000 (meat inspection).

**Inspection at Public Markets:**

*Object.*—To provide for the interstate transportation or export from public markets of portions of inspected and passed meats and meat-food products which, when cut from the marked carcasses, do not show the inspection legend.

*Location.*—42 cities, more or less, throughout the United States.

*Date begun.*—January 1, 1908.

*Results.*—This project is conducted in connection with the others concerning meat-inspection work, and it is impracticable to measure the results in exact terms.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$14,000 (meat inspection, \$13,000; statutory, \$1,000).

**Supervising Operations Conducted Under Certificates of Exemption:**

*Object.*—To ascertain whether or not shippers are in reality retail butchers, retail dealers, or farmers; also to see that the establishments operating under certificates of exemption are maintained in a sanitary condition and that the articles so shipped are fit for human food.

*Location.*—152 cities, more or less, throughout the United States.

*Date begun.*—1906.

*Results.*—On July 1, 1913, there were 2,548 individuals and establishments holding exemption certificates which permitted them to make interstate shipments of meats and meat-food products. During the first 11 months of the fiscal year 1914, there were 538 certificates of exemption issued to other individuals and establishments; there were also 1,173 certificates canceled, leaving 1,913 certificates outstanding and in force on June 1, 1914.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$13,700 (meat inspection).

### Examination of Meats and Meat-Food Products Imported from Foreign Countries:

*Object.*—The prevention of importation of meat and meat-food products which are not properly certified, or which are falsely labeled, or which are unsound, unhealthful, unwholesome, or otherwise unfit for human food.

*Cooperation.*—Bureau Chemistry.

*Location.*—61 cities, more or less, throughout the United States.

*Date begun.*—1913.

*Results.*—From October 3, 1913, to April 30, 1914, the products inspected under this project amounted to 124,656,703 pounds.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$75,000 (meat inspection).

### Laboratory Meat Inspection and Investigation of Samples of Meat and Meat-Food Products:

*Object.*—To ascertain whether prohibited substances have been used in the preparation of meat-food products and whether such products have been properly labeled.

*Cooperation.*—Bureau of Chemistry; Bureau of Internal Revenue, Treasury Department.

*Location.*—Chicago, Ill.; New York, N. Y.; Kansas City, Mo.; South Omaha, Nebr.; National Stock Yards, Ill., and San Francisco, Cal.

*Date begun.*—1906.

*Results.*—During the first ten months of the fiscal year 1914, approximately 19,500 samples of meat and meat-food products were analyzed.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$72 100 (meat inspection).

### Investigation of Pathological Conditions Noted During Routine Federal Meat Inspection:

*Object.*—To develop information relative to any abnormal or unusual conditions encountered in the meat inspection work, special attention being given to infectious conditions and those characterized by malignancy.

*Location.*—Washington, D. C.; Chicago, Ill., and South Omaha, Nebr.

*Date begun.*—1907.

*Results.*—Published in Bureau Annual Report for 1907, "Embryonal Adenosarcoma of the Kidney of Swine;" 1910 Annual Report "Primary Splenomegaly in Sheep."

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$11,000 (meat inspection).

### Miscellaneous Meat Inspection:

*Object.*—This represents various minor activities relating to the meat-inspection work which are not of sufficient importance to be carried as separate projects, such as items incidental to the maintenance of the 232, more or less, meat-inspection stations in the field, the expenses incidental to the transfer of employees between stations, and other miscellaneous items which are common to all meat-inspection work which may be conducted at the various stations.

*Location.*—232 cities and towns, more or less, throughout the United States.

*Date begun.*—1891.

*Assignment.*—See list of stations, which follows.

*Proposed expenditures, 1914-15.*—\$376,335 (meat inspection, \$299,100; statutory, \$77,235).

**Total, Meat Inspection, \$3,454,015 (statutory, \$128,015; meat inspection, \$3,326,000.**

## MEAT-INSPECTION STATIONS.

| Location.                 | Character of work.  | Date begun. | Assignment.           | Proposed expenditures, 1914-15. |
|---------------------------|---|-------------|-----------------------|---------------------------------|
| Albany, N. Y. ....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1909        | J. E. Gibson. ....    | \$3,890.52                      |
| Alexandria, Va. ....      | Preparation and shipping, miscellaneous.  | 1910        | .....                 | 1,000.00                        |
| Allentown, Pa. ....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | N. C. Powell. ....    | 4,807.37                        |
| Alton, Ill. ....          | do. ....  | 1906        | Jas. Johnston. ....   | 4,220.09                        |
| Arabi, La. ....           | Ante-mortem and post-mortem. ....   | 1906        | .....                 | 4,512.00                        |
| Arkansas City, Kans. .... | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | Jas. E. Shelton. .... | 2,836.63                        |
| Ashland, Ky. ....         | Preparation and shipping, miscellaneous.  | 1914        | .....                 | 800.00                          |
| Auburn, Me. ....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | L. K. Green. ....     | 3,205.30                        |
| Auburn, Mass. ....        | Preparation and shipping, miscellaneous, and exemption work.  | 1906        | .....                 | 1,271.40                        |
| Augusta, Ga. ....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.                                  | 1908        | F. L. Gardner. ....   | 3,810.08                        |
| Austin, Minn. ....        | do. ....  | 1901        | J. Miller. ....       | 10,620.68                       |
| Austin, Tex. ....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1906        | .....                 | 1,978.56                        |
| Baltimore, Md. ....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, Navy inspection, import meats, public markets, and exemption work. | 1904        | H. A. Hedrick. ....   | 53,827.84                       |
| Bayonne, N. J. ....       | Preparation and shipping, miscellaneous.  | 1908        | .....                 | 1,162.20                        |
| Beaumont, Tex. ....       | do. ....  | 1908        | .....                 | 1,260.00                        |
| Beaver Falls, Pa. ....    | Preparation and shipping, miscellaneous, public markets, and exemption work.  | 1909        | .....                 | 1,000.00                        |
| Belmont, Mass. ....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1906        | .....                 | 500.00                          |
| Bellows Falls, Vt. ....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1912        | T. W. Carnahan. ....  | 1,933.01                        |
| Benning, D. C. ....       | Ante-mortem, post-mortem, and shipping.   | 1906        | .....                 | 2,100.00                        |
| Binghamton, N. Y. ....    | Preparation and shipping, miscellaneous, and public markets.  | 1906        | .....                 | 1,398.00                        |
| Boston, Mass. ....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work. | 1895        | J. F. Ryder. ....     | 46,385.07                       |
| Bradford, Pa. ....        | Preparation and shipping, miscellaneous, and exemption work.  | 1908        | .....                 | 1,612.00                        |
| Bridgeport, Conn. ....    | Ante-mortem, post-mortem; preparation and shipping, miscellaneous, and import meats.  | 1909        | J. F. Riemer. ....    | 1,359.00                        |
| Bridgeport, Pa. ....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | .....                 | 2,024.28                        |
| Brighton, Mass. ....      | Ante-mortem, post-mortem, preparation and shipping, and miscellaneous.  | 1897        | .....                 | 9,000.00                        |
| Brightwood, Mass. ....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.                                  | 1900        | H. E. Brown. ....     | 9,202.17                        |
| Brockton, Mass. ....      | Preparation and shipping. ....  | 1910        | .....                 | 1,000.00                        |
| Brooklyn, N. Y. ....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work. | 1895        | A. Long. ....         | 54,601.78                       |
| Buffalo, N. Y. ....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.                  | 1892        | B. P. Wende. ....     | 81,017.61                       |
| Burlington, Vt. ....      | Ante-mortem, post-mortem, preparation and shipping, import meats, and exemption work.   | 1906        | C. C. Conley. ....    | 1,310.02                        |
| Cambridge, Mass. ....     | Preparation and shipping, miscellaneous.  | 1893        | .....                 | 1,700.00                        |
| Camden, N. J. ....        | do. ....  | 1906        | .....                 | 1,224.00                        |

*Meat-inspection stations—Continued.*

| Location.                | Character of work.   | Date begun. | Assignment.         | Proposed expenditures, 1914-15. |
|--------------------------|--|-------------|---------------------|---------------------------------|
| Canajoharie, N. Y.....   | Preparation and shipping, miscellaneous, and exemption work.   | 1906        | .....               | \$1,347.60                      |
| Cedar Rapids, Iowa.....  | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1896        | F. Jelen.....       | 21,289.06                       |
| Central Falls, R. I..... | Preparation and shipping, miscellaneous.   | 1906        | .....               | 1,008.00                        |
| Charleston, Tenn.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1907        | .....               | 775.96                          |
| Chattanooga, Tenn.....   | Preparation and shipping, miscellaneous.   | 1911        | .....               | 1,000.00                        |
| Chester, Pa.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | .....               | 3,205.44                        |
| Cheyenne, Wyo.....       | do.....  | 1907        | A. T. Knowles....   | 3,203.32                        |
| Chicago, Ill.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, exemption work, and laboratory meat inspection. | 1891        | W. N. Neil.....     | 507,166.33                      |
| Chicopee, Mass.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1906        | .....               | 1,700.00                        |
| Cincinnati, Ohio.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, exemption work.   | 1895        | D. C. Burnett.....  | 88,927.01                       |
| Circleville, Ohio.....   | Preparation and shipping, miscellaneous.   | 1909        | .....               | 25.00                           |
| Clarkston, Wash.....     | Ante-mortem and post-mortem.....   | 1907        | .....               | 1,400.00                        |
| Cleona, Pa.....          | Preparation and shipping, miscellaneous.   | 1906        | .....               | 180.00                          |
| Cleveland, Ohio.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.                             | 1892        | H. H. George.....   | 75,818.24                       |
| Columbus, Ohio.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | D. W. Everly.....   | 6,786.14                        |
| Corning, N. Y.....       | Preparation and shipping, miscellaneous, and exemption work.   | 1906        | .....               | 552.00                          |
| Cortland, N. Y.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.   | 1906        | A. F. Staub.....    | 4,685.34                        |
| Cudahy, Wis.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1891        | .....               | 1,900.00                        |
| Cumberland, Md.....      | Preparation and shipping, miscellaneous, and exemption work.   | 1908        | J. C. Shafer.....   | 1,344.00                        |
| Dallas, Tex.....         | Preparation and shipping, miscellaneous.   | 1906        | .....               | 1,080.00                        |
| Davenport, Iowa.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.   | 1896        | J. W. Joss.....     | 4,471.28                        |
| Dayton, Ohio.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | F. L. Gardner....   | 12,270.74                       |
| Denver, Colo.....        | do.....  | 1903        | J. C. Exline.....   | 39,895.49                       |
| Des Moines, Iowa.....    | do.....  | 1901        | W. J. Stewart....   | 5,975.82                        |
| Detroit, Mich.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.                             | 1899        | E. P. Schaffter.... | 43,152.99                       |
| Dover, Del.....          | Preparation and shipping and exemption work.   | 1906        | .....               | 885.12                          |
| Dover, N. J.....         | Preparation and shipping, miscellaneous.   | 1910        | .....               | 1,225.00                        |
| Dubuque, Iowa.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | W. C. Bower.....    | 3,329.93                        |
| Duluth, Minn.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.   | 1906        | E. S. Dickey.....   | 4,316.51                        |
| East Deering, Me.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1906        | .....               | 2,916.48                        |
| Easton, Pa.....          | Preparation and shipping, miscellaneous.   | 1914        | .....               | 500.00                          |
| Eau Claire, Wis.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1899        | W. Fotheringham.    | 4,352.50                        |
| Elmira, N. Y.....        | Preparation and shipping, and exemption work.  | 1908        | .....               | 840.00                          |

*Meat-inspection stations—Continued.*

| Location.                | Character of work.   | Date begun. | Assignment.                 | Proposed expenditures, 1914-15. |
|--------------------------|--|-------------|-----------------------------|---------------------------------|
| El Paso, Tex.....        | Preparation and shipping, miscellaneous, import meats, and exemption work.                             | 1907        | C. T. Bertrand....          | \$5,606.45                      |
| Eola, Ill.....           | Preparation and shipping, miscellaneous.   | 1906        | .....                       | 1,000.00                        |
| Erie, Pa.....            | Preparation and shipping, miscellaneous, and exemption work.   | 1911        | .....                       | 2,005.00                        |
| Evansville, Ind.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1906        | L. Metsker.....             | 5,632.73                        |
| Fairmont, Minn.....      | do.....  | 1912        | J. D. Stillwell....         | 1,806.00                        |
| Fall River, Mass.....    | Preparation and shipping, miscellaneous, and exemption work.   | 1906        | .....                       | 1,982.40                        |
| Fargo, N. Dak.....       | do.....  | 1909        | E. H. Clark.....            | 1,321.98                        |
| Faribault, Minn.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1913        | R. E. Christopher           | 1,090.04                        |
| Fergus Falls, Minn.....  | do.....  | 1907        | M. L. Davenport..           | 1,806.00                        |
| Fitchburg, Mass.....     | Preparation and shipping, miscellaneous.   | 1910        | .....                       | 1,224.00                        |
| Fort Atkinson, Wis....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1906        | .....                       | 405.00                          |
| Fort Smith, Ark.....     | Preparation and shipping, miscellaneous, and exemption work.   | 1909        | W. B. Nichols....           | 1,320.00                        |
| Fort Wayne, Ind.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1906        | E. W. Barthold...           | 4,979.16                        |
| Fort Worth, Tex.....     | do.....  | 1902        | C. E. Mauldin and 52 others | 65,021.01                       |
| Frederick, Md.....       | do.....  | 1911        | C. B. Weagly and 1 other.   | 2,908.50                        |
| Georgetown, Mass.....    | Ante-mortem and post-mortem.....   | 1906        | .....                       | 1,400.00                        |
| Grand Rapids, Wis....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1909        | F. C. Kickbuseh..           | 2,730.00                        |
| Greenville, Tenn.....    | Ante-mortem, post-mortem, preparation and shipping, and miscellaneous.                                 | 1907        | .....                       | 702.12                          |
| Greenville, Tex.....     | Preparation and shipping, miscellaneous.   | 1906        | .....                       | 1,032.00                        |
| Greenville, Miss.....    | do.....  | 1910        | .....                       | 1,000.00                        |
| Gretna, La.....          | do.....  | 1906        | .....                       | 1,320.00                        |
| Guttenberg, N. J.....    | do.....  | 1906        | .....                       | 1,200.00                        |
| Hallstead, Pa.....       | Ante-mortem, post-mortem, miscellaneous, and exemption work, and preparation and shipping.             | 1908        | S. M. Page.....             | 1,601.40                        |
| Hamilton, Ohio.....      | Ante-mortem, post-mortem, preparation and shipping, and miscellaneous.                                 | 1906        | .....                       | 2,510.00                        |
| Harrisburg, Pa.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1906        | W. C. Siegmund..            | 6,590.35                        |
| Hartford, Conn.....      | Preparation and shipping, miscellaneous, import meats, public markets, and exemption work.             | 1906        | W. E. Jennings...           | 1,328.52                        |
| Harvey, La.....          | Preparation and shipping, miscellaneous.   | 1911        | .....                       | 1,344.00                        |
| Haverhill, Mass.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work. | 1906        | H. Q. Thompson..            | 3,511.76                        |
| Hoboken, N. J.....       | Preparation and shipping, miscellaneous.   | 1906        | .....                       | 2,333.04                        |
| Houston, Tex.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.   | 1906        | C. F. Palmer.....           | 10,737.16                       |
| Hudson, N. Y.....        | Preparation and shipping, miscellaneous, and exemption work.   | 1906        | .....                       | 1,289.52                        |
| Indianapolis, Ind.....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1892        | G. H. Butler.....           | 73,094.10                       |
| Jacksonville, Ill.....   | do.....  | 1906        | J. B. Clancy.....           | 3,199.99                        |
| Jacksonville, Fla.....   | Preparation and shipping, miscellaneous.   | 1909        | .....                       | 2,510.00                        |
| Jefferson, Wis.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                 | 1906        | Geo. Jerome.....            | 1,863.72                        |
| Jefferson City, Tenn.... | Ante-mortem, post-mortem, preparation, and shipping, miscellaneous.                                    | 1907        | .....                       | 138.00                          |

*Meat-inspection stations—Continued.*

| Location.              | Character of work.  | Date begun. | Assignment.         | Proposed expenditures, 1914-15. |
|------------------------|---|-------------|---------------------|---------------------------------|
| Jersey City, N. J..... | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.             | 1891        | R. M. Mullings....  | \$49,687.01                     |
| Kansas City, Kans..... | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, exemption work, and laboratory meat inspection. | 1891        | J. Fleming.....     | 288,131.75                      |
| Kansas City, Mo.....   | Preparation and shipping, miscellaneous.  | 1906        | .....               | 1,000.00                        |
| Kearney, N. J.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1904        | .....               | 10,800.00                       |
| Keene, N. H.....       | .....do.....  | 1908        | .....               | 1,933.01                        |
| Kirksville, Mo.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1910        | W. L. Cohenour, jr. | 3,063.36                        |
| La Crosse, Wis.....    | .....do.....  | 1906        | W. H. Dell.....     | 2,968.06                        |
| La Fayette, Ind.....   | .....do.....  | 1906        | C. H. Herrold.....  | 4,415.38                        |
| Lancaster, Pa.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1911        | .....               | 60.00                           |
| Langthorne, Pa.....    | Preparation and shipping, miscellaneous.  | 1913        | .....               | 438.00                          |
| Lebanon, Ind.....      | .....do.....  | 1906        | .....               | 1,000.00                        |
| Lebanon, Pa.....       | .....do.....  | 1906        | .....               | 1,080.00                        |
| Leesburg, Va.....      | .....do.....  | 1911        | .....               | 500.00                          |
| Lewiston, Idaho.....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1907        | J. B. Hollenbeck..  | 3,399.26                        |
| Lincoln, Nebr.....     | .....do.....  | 1912        | G. A. Kay.....      | 1,909.15                        |
| Little Rock, Ark.....  | .....do.....  | 1913        | J. Keppel.....      | 3,072.00                        |
| Logansport, Ind.....   | .....do.....  | 1906        | E. H. Carter.....   | 3,700.33                        |
| London, England.....   | Miscellaneous duties relating to consignments of meats and meat food products exported from the United States to Great Britain and other work.    | 1890        | .....               | 4,157.27                        |
| Los Angeles, Cal.....  | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.             | 1896        | G. T. Irons.....    | 44,753.30                       |
| Louisville, Ky.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.                              | 1896        | A. J. Payne.....    | 10,792.36                       |
| Lynn, Mass.....        | Preparation and shipping, miscellaneous.  | 1906        | .....               | 1,000.00                        |
| Madison, Ind.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | H. Loth.....        | 1,804.52                        |
| Manchester, N. H.....  | Preparation and shipping, miscellaneous, public markets, and exemption work.  | 1907        | J. Hurley.....      | 1,482.12                        |
| Marshalltown, Iowa.... | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1896        | D. E. Collins.....  | 5,676.25                        |
| Mason City, Iowa.....  | .....do.....  | 1904        | R. W. Culbert....   | 6,523.19                        |
| McKeesport, Pa.....    | Preparation and shipping, miscellaneous.  | 1911        | .....               | 1,200.00                        |
| Media, Pa.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1907        | .....               | 768.36                          |
| Memphis, Tenn.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.  | 1906        | J. O. F. Price..... | 7,805.11                        |
| Menominee, Mich.....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1911        | S. S. Snyder.....   | 1,600.00                        |
| Middletown, N. Y.....  | Preparation and shipping, exemption work.   | 1910        | .....               | 1,380.00                        |
| Milwaukee, Wis.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.                              | 1891        | A. E. Behnke....    | 52,318.10                       |
| Mobile, Ala.....       | Preparation and shipping, miscellaneous.  | 1908        | .....               | 1,380.00                        |
| Morristown, Tenn.....  | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1907        | S. L. Bond.....     | 3,779.10                        |
| Moscow, Idaho.....     | .....do.....  | 1911        | L. C. Henderson..   | 1,800.00                        |

*Meat-inspection stations—Continued.*

| Location.                  | Character of work.  | Date begun. | Assignment.         | Proposed expenditures, 1914-15. |
|----------------------------|---|-------------|---------------------|---------------------------------|
| Nashville, Tenn.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.  | 1904        | W. B. Lincoln....   | \$10,116.27                     |
| Natchez, Miss.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1908        | M. J. Myers.....    | 3,713.44                        |
| National Stock Yards, Ill. | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, exemption work, and laboratory meat inspection.                                  | 1892        | E. L. Bertram....   | 130,613.99                      |
| Nebraska City, Nebr...     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1901        | E. F. Haven.....    | 7,384.49                        |
| Newark, N. J.....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.  | 1904        | A. F. Martins.....  | 13,468.42                       |
| Newcastle, Pa.....         | Preparation and shipping, miscellaneous.  | 1911        | .....               | 1,000.00                        |
| New Haven, Conn.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.  | 1899        | R. O. Brock.....    | 9,024.40                        |
| New Orleans, La.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.                             | 1906        | R. W. Tuck.....     | 8,693.1                         |
| Newport, R. I.....         | Preparation and shipping, miscellaneous.  | 1906        | .....               | 1,229.88                        |
| New York, N. Y.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, exemption work, and laboratory meat inspection. | 1891        | N. L. Townsend ..   | 195,685.02                      |
| Norfolk, Va.....           | Preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.   | 1908        | T. M. Owen.....     | 2,817.54                        |
| North Adams, Mass. ....    | Preparation and shipping, miscellaneous, and exemption work.  | 1909        | .....               | 1,355.64                        |
| North Augusta, S. C. ....  | Ante-mortem and post-mortem .....   | 1908        | .....               | 1,600.00                        |
| North Bergen, N. J.....    | Ante-mortem, post-mortem, miscellaneous.  | 1906        | .....               | 1,502.40                        |
| North Fork, W. Va.....     | Preparation and shipping .....  | 1914        | .....               | 1,266.48                        |
| North Tazewell, Va.....    | Ante-mortem, post-mortem, preparation and shipping, and exemption work.   | 1913        | O. J. Huth.....     | 1,800.00                        |
| Ogden, Utah.....           | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | R. B. Leeper.....   | 4,319.44                        |
| Oklahoma, Okla.....        | do.....   | 1906        | A. O. Lundell.....  | 41,708.34                       |
| Olathe, Kans.....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1906        | .....               | 1,944.00                        |
| Orlean, N. Y.....          | Preparation and shipping, miscellaneous, and exemption work.  | 1908        | .....               | 1,610.00                        |
| Ottumwa, Iowa.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1892        | I. K. Atherton....  | 22,277.38                       |
| Palmira, Pa.....           | Preparation and shipping, miscellaneous.  | 1909        | .....               | 600.00                          |
| Passaic, N. J.....         | do.....   | 1906        | .....               | 2,418.00                        |
| Paterson, N. J.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.  | 1906        | A. McBride.....     | 12,350.40                       |
| Pawtucket, R. I.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1906        | .....               | 6,872.76                        |
| Pensacola, Fla.....        | Preparation and shipping, and exemption work.   | 1912        | .....               | 1,380.00                        |
| Peoria, Ill.....           | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | A. H. Hughes.....   | 8,162.90                        |
| Philadelphia, Pa.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.                             | 1893        | C. A. Schauffer.... | 80,830.00                       |
| Phillipsburg, N. J.....    | Preparation and shipping, miscellaneous, and exemption work.  | 1909        | .....               | 1,410.00                        |

*Meat-inspection stations—Continued.*

| Location.               | Character of work.   | Date begun. | Assignment.        | Propo s<br>tures<br>1914-15 |
|-------------------------|--|-------------|--------------------|-----------------------------|
| Pittsburg, Kans.....    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | J. E. Blackwell... | \$2,007.28                  |
| Pittsburgh, Pa.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.   | 1892        | G. E. Totten.....  | 22,000.98                   |
| Pomona, Cal.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1908        | .....              | 1,400.00                    |
| Port Chester, N. Y..... | Preparation and shipping.....  | 1913        | .....              | 1,307.52                    |
| Portland, Me.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.   | 1896        | F. W. Huntington.  | 6,477.63                    |
| Portland, Oreg.....     | do.....  | 1897        | E. J. Ross.....    | 22,059.79                   |
| Portsmouth, N. H.....   | Preparation and shipping, miscellaneous and exemption work.  | 1909        | .....              | 1,408.00                    |
| Pottsville, Pa.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | G. H. Woolfolk..   | 6,067.03                    |
| Providence, R. I.....   | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.                                | 1906        | H. M. Smith.....   | 12,579.32                   |
| Pueblo, Colo.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | T. S. Rich.....    | 4,290.19                    |
| Purcellville, Va.....   | Preparation and shipping, miscellaneous.   | 1912        | .....              | 500.00                      |
| Quincy, Ill.....        | Preparation and shipping, miscellaneous, public markets, and exemption work.   | 1908        | J. E. Sahland....  | 1,200.00                    |
| Reno, Nev.....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.   | 1906        | J. H. Webster..... | 5,037.54                    |
| Richmond, Ind.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1906        | C. O. Wagoner....  | 1,836.00                    |
| Richmond, Va.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.   | ....        | H. Marshall.....   | 15,375.44                   |
| Rochester, N. Y.....    | Preparation and shipping, miscellaneous, import meats, and exemption work.   | 1906        | P. W. Campbell...  | 1,218.84                    |
| Rockford, Ill.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.   | 1908        | B. Baldwin.....    | 7,068.41                    |
| Roslyn, Va.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1906        | .....              | 1,400.00                    |
| St. Louis, Mo.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work.   | 1895        | J. L. Brougham...  | 66,935.95                   |
| Saegertown, Pa.....     | Preparation and shipping, exemption work.  | 1913        | .....              | 1,600.00                    |
| Salt Lake City, Utah... | Preparation and shipping, miscellaneous, and exemption work.   | 1906        | F. E. Murray.....  | 1,260.00                    |
| San Antonio, Tex.....   | Preparation and shipping, miscellaneous, import meats.   | 1911        | .....              | 1,020.00                    |
| San Diego, Cal.....     | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, and exemption work.  | 1901        | W. M. MacKellar..  | 6,965.76                    |
| San Francisco, Cal..... | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work and laboratory meat inspection. | 1895        | H. H. Hicks.....   | 25,878.04                   |
| Savannah, Ga.....       | Preparation and shipping, miscellaneous, and import meats.   | 1906        | .....              | 3,676.00                    |
| Seattle, Wash.....      | Ante-mortem, post-mortem, preparation, and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.                               | 1900        | J. Madsen.....     | 23,852.66                   |
| Sherman, Tex.....       | Preparation and shipping, miscellaneous.   | 1906        | .....              | 1,068.00                    |
| Shreveport, La.....     | Preparation and shipping, miscellaneous, and exemption work.   | 1908        | L. Bryant.....     | 1,321.21                    |

*Meat-inspection stations—Continued.*

| Location.                   | Character of work.  | Date begun. | Assignment.        | Proposed expenditures, 1914-15. |
|-----------------------------|---|-------------|--------------------|---------------------------------|
| Sioux City, Iowa.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1894        | T. A. Shipley..... | \$67,392.96                     |
| Sioux Falls, S. Dak.....    | do.....   | 1906        | C. Miller.....     | 14,622.11                       |
| Smithfield, Va.....         | Preparation and shipping, miscellaneous.  | 1908        | .....              | 1,205.00                        |
| Somerville, Mass.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1891        | .....              | 27,000.00                       |
| Southboro, Mass.....        | do.....   | 1906        | .....              | 1,500.00                        |
| South Bellingham, Mass..... | Preparation and shipping, miscellaneous.  | 1907        | .....              | 1,257.72                        |
| South Omaha, Nebr....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, exemption work, and laboratory meat inspection. | 1891        | H. Busman.....     | 167,987.45                      |
| South St. Joseph, Mo..      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.  | 1898        | M. O. Anderson...  | 102,008.42                      |
| South St. Paul, Minn..      | Ante-mortem, post-mortem, miscellaneous, preparation and shipping, import meats, and exemption work.  | 1895        | F. D. Ketchum...   | 42,000.00                       |
| Spokane, Wash.....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1906        | C. M. McFarland..  | 18,801.98                       |
| Springfield, Mass.....      | Preparation and shipping, miscellaneous, public markets, and exemption work.  | 1906        | .....              | 3,000.00                        |
| Stamford, Conn.....         | Preparation and shipping, miscellaneous.  | 1913        | .....              | 1,047.12                        |
| Syracuse, N. Y.....         | do.....   | 1906        | .....              | 1,320.00                        |
| Tacoma, Wash.....           | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.  | 1904        | E. K. Ward.....    | 14,696.65                       |
| Terre Haute, Ind.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1912        | N. C. Sorensen.... | 4,491.29                        |
| Texarkana, Tex.....         | Preparation and shipping, exemption work.   | 1913        | H. G. Potter.....  | 1,142.22                        |
| Toledo, Ohio.....           | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1906        | .....              | 3,762.91                        |
| Topeka, Kans.....           | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1901        | W. L. Johnson....  | 7,950.96                        |
| Trenton, N. J.....          | Preparation and shipping, public markets, and exemption work.   | 1906        | .....              | 650.00                          |
| Union City, Tenn.....       | Ante-mortem, post-mortem, preparation and shipping, and miscellaneous.  | 1911        | .....              | 1,692.00                        |
| Union Hill, N. J.....       | Preparation and shipping, miscellaneous.  | 1909        | .....              | 1,600.00                        |
| Vicksburg, Miss.....        | do.....   | 1912        | .....              | 1,200.00                        |
| Walla Walla, Wash....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1907        | H. E. Pinkerton..  | 3,978.10                        |
| Washington, D. C.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, Navy inspection, public markets, and exemption work.                             | 1906        | H. K. Walter.....  | 11,269.08                       |
| Waterloo, Iowa.....         | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1900        | F. T. Suit.....    | 6,823.18                        |
| Watertown, S. Dak.....      | do.....   | 1913        | R. G. Rice.....    | 913.27                          |
| West Chester, Pa.....       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.  | 1912        | .....              | 1,599.96                        |
| West Newbury, Mass....      | do.....   | 1906        | .....              | 1,600.00                        |
| West Toledo, Ohio.....      | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, and exemption work.  | 1906        | S. W. Burt.....    | 3,762.91                        |
| Wheeling, W. Va.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.  | 1906        | W. O. Trone.....   | 12,763.58                       |
| Wichita, Kans.....          | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.  | 1897        | J. S. Kelly.....   | 39,318.25                       |
| Wilmington, Del.....        | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, public markets, and exemption work.  | 1906        | G. E. Repp.....    | 6,197.75                        |

*Meat-inspection stations—Continued.*

| Location.                               | Character of work.   | Date begun. | Assignment.      | Proposed expenditures, 1914-15. |
|---|--|-------------|------------------|---------------------------------|
| Wilmington, N. C.....                   | Preparation and shipping, miscellaneous.   | 1913        | .....            | \$1,000.00                      |
| Winona, Minn.....                       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, and exemption work.                               | 1907        | W. J. Fretz..... | 5,125.99                        |
| Woburn, Mass.....                       | Ante-mortem, post-mortem, preparation and shipping, miscellaneous.   | 1907        | .....            | 700.00                          |
| Woodsdale, Ohio.....                    | do.....  | 1908        | .....            | 50.00                           |
| Worcester, Mass.....                    | Ante-mortem, post-mortem, preparation and shipping, miscellaneous, import meats, public markets, and exemption work. | 1898        | M. T. Perry..... | 7,949.04                        |
| Youngstown, Ohio.....                   | Preparation and shipping, public markets, and exemption work.  | 1908        | .....            | 1,860.00                        |
| Zion City, Ill.....                     | Preparation and shipping, miscellaneous.   | 1913        | .....            | 1,000.00                        |
| <b>Total. Meat-Inspection Stations.</b> | .....  | .....       | .....            | <b>3,327,315.00</b>             |

## ERADICATION AND CONTROL OF ANIMAL DISEASES AND PREVENTING THE INTERSTATE SPREAD OF CONTAGION.

### Administration:

*Object.*—Supervision of all work connected with the eradication and control of animal diseases, and the performance of duties common to the whole work.

*Location.*—Washington, D. C.

*Date begun.*—1884.

*Assignment.*—M. Dcrset, J. R. Mohler, R. W. Hickman, R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$10,201 (statutory, \$2,000; administrative expenses, \$8,201).

### Supervision of Interstate Transportation of Live Stock:

*Object.*—To make a careful examination and inspection of all live stock unloaded at market centers and public stockyards where Federal inspection is maintained, to determine the presence in any of the animals of communicable diseases which might be transmitted to animals in other States; also to issue interstate certification covering interstate movement of animals free from disease or which have been treated under bureau supervision.

*Location.*—64 cities, more or less, at various points throughout the United States.

*Date begun.*—1884.

*Results.*—During the first 10 months of the fiscal year 1914 there were 19,886,498 sheep inspected and 413,638 dipped; 12,643,244 cattle inspected and 107,936 dipped; also 26,720 cars cleaned and disinfected.

*Assignment.*—R. A. Ramsay, W. P. Ellenberger.

*Proposed expenditures, 1914-15.*—\$140,000 (inspection and quarantine, \$117,000; meat inspection, \$8,000; statutory, \$15,000).

### Eradication of Scabies in Sheep:

*Object.*—To devise and demonstrate proper treatment for eradication of the disease, provide measures to prevent its spread, and clean and disinfect cars, pens, and other premises, with the view of fostering the industry and encouraging greater production of mutton and wool.

*Cooperation.*—Live-stock sanitary boards and other organizations in Arizona, \$43,500; California, \$10,570; Tennessee, \$2,000; Nevada, \$15,444; New Mexico, \$24,000; Texas, \$915; Utah, \$9,780; Idaho, \$12,367; Kansas, \$796; Kentucky, \$22,013; Missouri, \$6,166; Oregon, \$9,000.

*Location.*—States mentioned under "Cooperation."

*Date begun.*—1903.

*Results.*—1,404,971 square miles of territory have been released from quarantine for scabies in sheep; 379,625 square miles still under Federal quarantine for this purpose. During the first 10 months of the fiscal year 1914 there were 25,310,083 sheep inspected, a decrease of approximately 8 per cent over the previous fiscal year; also, 7,859,121 of the animals dipped, which is a decrease of approximately 17 per cent over the previous fiscal year.

*Assignment.*—R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$177,000 (inspection and quarantine, \$168,000; statutory, \$9,000).

### **Eradication of Mange (Scabies) in Cattle and Horses:**

*Object.*—To eradicate scabies in cattle and horses by the same means followed in the case of sheep, as described above, thereby fostering the horse industry and increasing the production of beef and dairy products.

*Cooperation.*—Live-stock sanitary boards and other organizations in Idaho, \$150; Montana, \$8,776; Nebraska, \$6,000; Texas, \$52,966; Wyoming, \$3,000; New Mexico, \$41,000; Oklahoma, \$1,019; Kansas, \$2,000; Missouri, \$115; Oregon, \$2,000; South Dakota, \$5,368.

*Location.*—States mentioned under "Cooperation."

*Date begun.*—1905.

*Results.*—1,179,136 square miles have been released from quarantine for cattle scabies; 90,708 square miles still under Federal quarantine for this purpose. No territory has been quarantined because of scabies in horses, as the eradication of this disease has been conducted in conjunction with the eradication of cattle scabies. During the first 10 months of the fiscal year 1914 there were 2,533,613 cattle inspected, which is a decrease of approximately 2 per cent over the previous fiscal year. There were also 1,501,576 cattle dipped, which is an increase of approximately 69 per cent over the previous fiscal year. During the same period 2,483 horses were inspected, a decrease of approximately 26 per cent over the previous fiscal year.

*Assignment.*—R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$130,000 (inspection and quarantine, \$126,500; statutory, \$3,500).

### **Inspection and Tuberculin Testing of Cattle and Mallein Testing of Horses for Interstate Movement:**

*Object.*—To prevent the spread of tuberculosis of cattle and of glanders in horses and mules.

*Cooperation.*—Work conducted in accordance with the laws and regulations of the State to which interstate shipments of animals are destined.

*Location.*—47 cities, more or less, throughout the United States at which veterinary inspectors are stationed.

*Date begun.*—1884.

*Results.*—During the first 10 months of the fiscal year 1914 there were 122,955 cattle inspected, a decrease of 17 per cent, and 21,664 tested, an increase of 33 per cent; also 42,020 horses and mules inspected, an increase of approximately 8 per cent, and 8,370 tested, an increase of approximately 22 per cent.

*Assignment.*—R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$36,000 (inspection and quarantine, \$35,500; statutory, \$500).

### **Investigating Alleged Violations of Live-Stock Quarantine Regulations:**

*Object.*—To obtain, for the use of the Department of Justice, specific information relating to interstate movement of live stock from areas under quarantine for contagious diseases in violation of department regulations.

*Cooperation.*—Live-stock and sanitary officials of the various States cooperate in this work; also the Solicitor of the Department, and the Attorney General of the United States.

*Location.*—Washington, D. C., and 64 cities, more or less, in various sections of the United States.

*Date begun.*—1884.

*Results.*—In the fiscal year 1914 there were submitted to the Solicitor of the department 105 reports of alleged violations of the quarantine laws; the fines imposed in the cases decided in favor of the Government, including costs, amounted to \$12,118.04.

*Assignment.*—R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$2,000 (inspection and quarantine).

### **Supervision of the Inoculation of Swine Against Hog Cholera for Interstate Movement from Public Stockyards:**

*Object.*—To provide for the interstate movement of swine from public stockyards for purposes other than immediate slaughter, if they have been properly immunized against hog cholera.

*Cooperation.*—Work conducted in accordance with the laws and regulations of the States to which interstate shipments of swine are destined.

*Location.*—22 cities, more or less, throughout the United States.

*Date begun.*—July 1, 1914.

*Assignment.*—R. A. Ramsay, W. P. Ellenberger.

*Proposed expenditures, 1914-15.*—\$10,000 (inspection and quarantine).

**Manufacture and Distribution of Blackleg Vaccine:**

*Object.*—Eradication of blackleg among cattle.

*Location.*—Washington, D. C.

*Date begun.*—1897.

*Results.*—During the first 10 months of the fiscal year 1914 there were 2,138,820 doses of blackleg vaccine distributed to various parties throughout the United States.

*Assignment.*—J. R. Mohler.

*Proposed expenditures, 1914-15.*—\$12,000 (inspection and quarantine, \$7,500; statutory, \$4,500).

**Investigation to Determine the Presence of Tuberculosis Among Dairy Animals:**

*Object.*—To suppress and prevent the spread of bovine tuberculosis interstate, with the view of providing milk supplies from cattle free from tuberculosis.

*Cooperation.*—State and municipal authorities in the localities where the work is conducted; also Office of Indian Affairs, Department of Interior.

*Location.*—Maryland, District of Columbia, Virginia, and various Indian reservations and schools.

*Date begun.*—1907.

*Results.*—During the first 10 months of the fiscal year 1914 there were 16,055 cattle tested in connection with this work.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$15,000 (inspection and quarantine, \$13,500; statutory, \$1,500).

**Eradication of Dourine:**

*Object.*—Eradication of this disease in order that the breeding of horses may be encouraged.

*Cooperation.*—Office of Indian Affairs, Interior Department, and various State officials in the States in which the work is conducted.

*Location.*—North Dakota, South Dakota, Montana, and Wyoming.

*Date begun.*—1912.

*Results.*—During the first 10 months of the fiscal year 1914 there were 18,000 horses inspected and tested in connection with this work.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$49,000 (eradication of hog cholera and dourine)

**Tuberculin Testing of Pure-Bred Breeding Cattle:**

*Object.*—To ascertain if tuberculosis exists among pure-bred cattle used for breeding purposes, with a view to eradicating such disease and encouraging the development of herds of pure-bred breeding cattle free from tuberculosis.

*Cooperation.*—Owners of herds.

*Location.*—Various places throughout the United States wherever herds are located.

*Date begun.*—July 1, 1914.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$25,000 (inspection and quarantine).

**Investigation and Chemical Testing of Dips and Disinfectants:**

*Object.*—To insure the employment of properly compounded dips and disinfectants in official dipping and disinfecting operations.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Dipping baths have been so standardized that they are of constant composition and efficiency.

*Assignment.*—R. M. Chapin.

*Proposed expenditures, 1914-15.*—\$6,500 (inspection and quarantine, \$3,500; administrative expenses, \$2,000; meat inspection, \$1,000).

**Manufacture and Distribution of Tuberculin:**

*Object.*—To furnish a supply of tuberculin for the testing of animals.

*Cooperation.*—No cooperation other than reports of results of tests obtained by the individuals to whom the tuberculin is sent.

*Location.*—Tuberculin manufactured at Washington, D. C., but used at various points in the field as required.

*Date begun.*—1892.

*Results.*—In the fiscal year 1914 there were 35,100 doses of tuberculin prepared and distributed.

*Assignment.*—M. Dorset, J. A. Emery.

*Proposed expenditures, 1914-15.*—\$5,500 (inspection and quarantine, \$2,500; meat inspection, \$1,500; statutory, \$1,500).

**Manufacture and Distribution of Mallein:**

*Object.*—To furnish a supply of mallein used for the testing of animals.

*Cooperation.*—No cooperation other than reports of results of tests obtained by the individuals to whom the mallein is sent.

*Location.*—Mallein manufactured in Washington, D. C., but used at various stations in the field as required.

*Date begun.*—About 1892.

*Results.*—During the fiscal year 1913 there were 150,668 doses of mallein prepared and distributed.

*Assignment.*—M. Dorset, J. A. Emery.

*Proposed expenditures, 1914-15.*—\$2,750 (inspection and quarantine, \$1,950; statutory, \$800.)

**Total, Eradication and Control of Animal Diseases and Preventing the Interstate Spread of Contagion,** \$620,951 (statutory, \$38,300; dourine, \$49,000; meat inspection, \$10,500; inspection and quarantine, \$512,950; administrative, \$10,201).

**ERADICATION OF CATTLE TICKS.****Eradication of Cattle Ticks:**

*Object.*—The extermination of the ticks which spread the infection of splenic fever of cattle.

*Cooperation.*—State organizations and institutions in Alabama, \$15,000; Arkansas, \$10,000; California, \$1,000; Florida, \$1,000; Georgia, \$35,000; Louisiana, \$10,000; Mississippi, \$99,000; North Carolina, \$15,000; Oklahoma, \$55,000; South Carolina, \$30,000; Tennessee, \$5,000; Texas, \$7,000; Virginia, \$1,500.

*Location.*—States mentioned under "Cooperation."

*Date begun.*—1906.

*Results.*—Since this work was begun, ticks have been exterminated from approximately 216,000 square miles of territory and this area released from Federal quarantine; 5,231,894 animals inspected during the first 10 months of the fiscal year 1914.

*Assignment.*—R. A. Ramsay, W. P. Ellenberger.

*Proposed expenditures, 1914-15.*—\$354,835 (statutory, \$8,335; eradicating cattle ticks, \$346,500).

**LIVE-STOCK DEMONSTRATION WORK IN AREAS FREED FROM CATTLE TICKS.****Live-Stock Work in Tick-Freed Areas:**

*Object.*—To demonstrate to farmers the best means within their reach to better develop the live-stock industry and dairying in the areas freed from cattle ticks in the Southern States.

*Cooperation.*—Bureau of Plant Industry, individual farmers and associations in different localities in the various Southern States from which ticks have been eradicated.

*Location.*—Various localities which have been freed from ticks in Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Arkansas, Oklahoma, Texas.

*Date begun.*—July 1, 1914.

*Assignment.*—R. A. Ramsay, B. H. Rawl, G. H. Rommel, of this bureau, Dr. Bradford Knapp, and employees, Bureau of Plant Industry, in charge of field forces in the Southern States.

*Proposed expenditures, 1914-15.*—\$50,000 (live-stock demonstrations in tick-free areas).

**DAIRY INVESTIGATIONS.****ADMINISTRATION.****Administration:**

*Object.*—General supervision of the Dairy Division work; includes branch library, files, requisitions and accounts, dairy engineering and architecture, compilation and indexing, editorial, and stenographic work.

*Location.*—Washington, D. C.

*Date begun.*—1895.

*Assignment.*—B. H. Rawl.

*Proposed expenditures, 1914-15.*—\$27,655 (dairy industry, \$18,355; statutory, \$9,300).

## DAIRY FARMING.

**Supervision:**

*Object.*—General supervision and office correspondence and record work; compilation of material for use in field work and preparation of manuscripts.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Assignment.*—Helmer Rabild.

*Proposed expenditures, 1914-15.*—\$13,680 (dairy industry, \$10,680; statutory, \$3,000).

**Southern Dairying:**

*Object.*—To introduce, develop, and improve the business of dairying in the Southern States; to work dairying into the system of cotton farming.

*Cooperation.*—With agricultural colleges and experiment stations in States named under "Location." The plan is to have the State take over the work in time.

*Location.*—Alabama, Georgia, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Virginia, and West Virginia.

*Date begun.*—1906.

*Results.*—About 600 homemade silos and a large number of dairy barns and dairy houses have been built; 510 dairymen have begun keeping herd records; 120 pure-bred bulls added to herds; 15 live-stock and dairy associations formed; 60 short-course dairy schools conducted.

*Assignment.*—J. H. McClain.

*Proposed expenditures, 1914-15.*—\$20,320 (dairy industry).

**Community Development:**

*Object.*—Demonstration of the practicability of the small community raising its economic status through the employment of a field instructor skilled in dairying.

*Cooperation.*—Algona Creamery Company; State Agricultural College; State Dairy and Food Commission.

*Location.*—Algona, Iowa.

*Date begun.*—1910.

*Results.*—In 1914, 12 pure-bred bulls and 76 dairy cows and heifers were purchased, 17 silos, 3 barns, 2 ice houses, and 4 milk houses built; many barns whitewashed and improved with floors and stanchions; milking machine and 2 cream tanks installed; many farmers planting from 1 to 30 acres of alfalfa.

*Assignment.*—R. R. Welch.

*Proposed expenditures, 1914-15.*—\$2,020 (dairy industry).

**Cow-Testing Associations and Bull Associations:**

*Object.*—To increase economically the average milk and butter-fat production of the dairy cows in the United States, and to improve the quality of the dairy herds.

*Cooperation.*—State dairy officials and associations.

*Location.*—United States.

*Date begun.*—1908.

*Results.*—In 1914, 73 cow-testing associations and 2 bull associations were organized.

*Assignment.*—Will Forbes, A. M. Goodman, F. H. Scribner.

*Proposed expenditures, 1914-15.*—\$17,400 (dairy industry).

**Dairy Demonstration Farm:**

*Object.*—To demonstrate the practicability of reclaiming a worn-out cotton farm by dairying.

*Cooperation.*—Denison Board of Trade.

*Location.*—Denison, Tex.

*Date begun.*—1907.

*Results.*—A demonstration herd has been established, starting with scrub animals and a pure-bred bull. Manure and humus added to the soil have resulted in good crops. Farmers in that vicinity are adopting this method.

*Assignment.*—Melvin Moss.

*Proposed expenditures, 1914-15.*—\$1,380 (dairy industry).

**Cooperation with County Agents:**

*Object.*—To assist county agents in special dairy work, such as silo and dairy building construction, feeding, care, and management of dairy cattle, special assistance at fairs, etc.

*Cooperation.*—County agents of Bureau of Plant Industry.

*Location.*—United States.

*Date begun.*—July 1, 1914.

*Assignment.*—Men to be appointed.

*Proposed expenditures, 1914-15.*—\$8,000 (dairy industry).

**Holstein Cattle Breeding:**

*Object.*—Breeding Holstein cattle suitable for conditions in the semiarid West.

*Cooperation.*—North Dakota Agricultural College.

*Location.*—New Salem, N. Dak.

*Date begun.*—1908.

*Results.*—Cooperation among farmers who use pure-bred cows has been established. A number are in the advanced registry. All members of the circuit have built silos.

*Probable date of completion.*—1915.

*Assignment.*—W. J. Downey.

*Proposed expenditures, 1914-15.*—\$1,000 (dairy industry).

**Total, Dairy Farming,** \$63,800 (statutory, \$3,000; dairy industry, \$60,800).

**DAIRY MANUFACTURING INVESTIGATIONS.****Supervision:**

*Object.*—General supervision of all work in dairy manufacturing, including educational work with creameries done by correspondence and conferences with field men; compilation of information collected.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—S. C. Thompson, Thomas Corneliussen.

*Proposed expenditures, 1914-15.*—\$9,050 (dairy industry, \$6,230; statutory, \$2,820).

**Creamery Management:**

*Object.*—To improve the quality of milk and cream delivered to creameries, the quality of product, and the general efficiency of creameries.

*Location.*—Iowa, South Dakota, Minnesota, Texas, Vermont, New York, New Jersey, Maryland, and by correspondence throughout the United States.

*Date begun.*—1906.

*Results.*—2,407 creameries report to the Dairy Division. The overrun has been increased from 16.96 per cent to 20.70 per cent in Minnesota and similarly in Wisconsin, Iowa, South Dakota, and Michigan. Leaks have been prevented.

*Assignment.*—Thomas Corneliussen, W. B. Liverance.

*Proposed expenditures, 1914-15.*—\$22,820 (dairy industry).

**Cheese-Factory Management:**

*Object.*—To improve the quality of the milk delivered to cheese factories, the methods of manufacture, and the quality of cheese.

*Location.*—Cheese section of the United States.

*Date begun.*—July 1, 1914.

*Assignment.*—Man to be appointed.

*Proposed expenditures, 1914-15.*—\$2,500 (dairy industry).

**Renovated-Butter Inspection:**

*Object.*—To carry on the inspection of renovated butter and factories producing same, as required by act of May 9, 1902.

*Location.*—United States.

*Date begun.*—1902.

*Results.*—Factories are inspected at intervals by one regular butter inspector and about 20 bureau meat inspectors. A fairly sanitary condition of the factories and product is maintained.

*Assignment.*—S. C. Thompson, M. W. Lang.

*Proposed expenditures, 1914-15.*—\$7,400 (dairy industry).

**Farm Butter Manufacture:**

*Object.*—To advise and encourage farmers in the various Southern States to produce a better quality of butter.

*Location.*—Tennessee, Kentucky, West Virginia, North Carolina, and South Carolina.

*Date begun.*—1913.

*Results.*—Efforts have been made to educate the people in farm butter making and in general dairy farming. Farmers' Bulletin 541 published.

*Assignment.*—J. R. Keithley.

*Proposed expenditures, 1914-15.*—\$2,020 (dairy industry).

**Butter Inspection for Navy Department:**

*Object.*—To assist the Navy Department in securing first-class canned creamery butter and to study the manufacture of butter for storage.

*Cooperation.*—Navy Department.

*Location.*—At creameries throughout the United States securing contracts for Navy butter.

*Date begun.*—1902.

*Results.*—A marked improvement in the quality of the butter obtained as compared with the quality of butter of former years. Sweet cream is churned and the deterioration in quality is much less.

*Assignment.*—S. C. Thompson.

*Proposed expenditures, 1914-15.*—\$1,000 (dairy industry).

**Total, Dairy Manufacturing Investigations,** \$45,390, (dairy industry, \$42,570; statutory, \$2,820).

**DAIRY RESEARCH LABORATORIES.****Supervision:**

*Object.*—General supervision and office work for laboratories.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—L. A. Rogers.

*Proposed expenditures, 1914-15.*—\$5,980 (dairy industry, \$3,060; statutory, \$2,920).

**Milk and Ice-Cream Investigations:**

*Object.*—General study of bacteriology, chemistry, and technology of milk and ice cream.

*Cooperation.*—Manufacturers and dealers.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Published in 12 bureau bulletins and circulars.

*Assignment.*—S. H. Ayers.

*Proposed expenditures, 1914-15.*—\$10,330 (dairy industry).

**Butter Investigations:**

*Object.*—Study of changes in flavor in butter; determination of causes and control.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Published in 13 bureau bulletins and circulars..

*Assignment.*—D. F. Dyer.

*Proposed expenditures, 1914-15.*—\$8,380 (dairy industry).

**Physiology of Milk Secretion:**

*Object.*—To obtain definite knowledge of the mechanism of milk secretion and of the factors which control or influence this function, with a view to a more logical breeding and feeding of dairy cows.

*Location.*—Washington, D. C., and Beltsville, Md.

*Date begun.*—July, 1914.

*Assignment.*—Physiologist to be appointed.

*Proposed expenditures, 1914-15.*—\$4,270 (dairy industry).

**Condensed Milk:**

*Object.*—To secure general knowledge of milk condensing. It is planned to make a survey of methods of manufacture, domestic and foreign, followed by chemical and bacteriological studies.

*Location.*—Washington, D. C.

*Date begun.*—June, 1914.

*Assignment.*—H. G. Menge.

*Proposed expenditures, 1914-15.*—\$3,920 (dairy industry).

**Swiss Cheese:**

*Object.*—To investigate the causes and control of ripening of Swiss cheese.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Manufacture of Swiss cheese at any season and any location made possible. B. A. I. Bulletin 151, and article in Centralblatt für Bakteriologie.

*Assignment.*—C. F. Doane.

*Proposed expenditures, 1914-15.*—\$9,835 (dairy industry).

**Soft Cheese:**

*Object.*—To determine methods of manufacture and ripening of Camembert, Roquefort, and other soft cheeses.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Logical method for making Camembert and Roquefort established. B. A. I. Bulletins 71, 82, 98, 109, 115, 118, 130; Circular 145.

*Assignment.*—Chas. Thom.

*Proposed expenditures, 1914-15.*—\$6,550 (dairy industry).

**Cheddar Cheese:**

*Object.*—Control of certain steps in manufacture and method of marketing Cheddar cheese.

*Cooperation.*—Manufacturers and dealers.

*Location.*—Washington, D. C., and Wisconsin.

*Date begun.*—1905.

*Results.*—Method of making cheese from pasteurized milk established. B. A. I. Bulletins 62, 85, 122, 123, 150, 165; Circulars 166, 181, and 210.

*Assignment.*—C. F. Doane.

*Proposed expenditures, 1914-15.*—\$816 (dairy industry).

**Casein and Other By-Products:**

*Object.*—To investigate methods of utilizing casein and other dairy by-products.

*Cooperation.*—Bureau of Standards.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Method of making casein from buttermilk established.

*Assignment.*—L. A. Rogers.

*Proposed expenditures, 1914-15.*—\$2,804 (dairy industry).

**Total, Dairy Research Laboratories,** \$52,885 (statutory, \$2,920; dairy industry, \$49,965).

**MARKET MILK INVESTIGATIONS.****Supervision:**

*Object.*—To supervise the work of the section, answer correspondence, etc.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—Ernest Kelly.

*Proposed expenditures, 1914-15.*—\$3,600 (dairy industry, \$3,000; statutory, \$600).

**Dairy Sanitation:**

*Object.*—To study the sanitation of city milk supplies, carry on educational work among dairymen and milk handlers, and unify and make more efficient inspections carried on by State and municipal boards of health.

*Cooperation.*—State and municipal boards of health.

*Location.*—United States.

*Date begun.*—1900.

*Results.*—Eight exhibits sent over the country. The score-card system of inspection has spread to over 200 cities. Agricultural colleges and many secondary schools use these score cards in class work. Milk and cream contests have been conducted. Over 100 plans for milk houses and city milk plants have been sent out.

*Assignment.*—Ernest Kelly, L. B. Cook.

*Proposed expenditures, 1914-15.*—\$10,200 (dairy industry).

**Cost of Handling and Distributing Milk:**

*Object.*—To determine the cost of distributing milk in cities, including cost of the various operations; to discover uneconomical methods and to suggest ways of cheapening the cost of distribution.

*Cooperation.*—Office of Markets and milk distributors throughout the United States.

*Location.*—United States.

**Cost of Handling and Distributing Milk—Continued.***Date begun.*—1912.*Results.*—The discovery of uneconomical practices and wasteful methods in numerous city milk plants. Through circular letters these results have been brought to the attention of milk dealers.*Assignment.*—Ernest Kelly, C. E. Clement.*Proposed expenditures, 1914-15.*—\$2,650 (dairy industry).**Cost of Milk Production:***Object.*—To ascertain the actual cost of milk production on the average dairy farm; to learn the increased cost of milk production attributable to modern sanitary methods and variation in cost of milk production in different sections.*Cooperation.*—Planned to work with State agricultural colleges; also Office of Markets.*Location.*—United States, with special locations to be selected.*Date begun.*—July 1, 1914.*Assignment.*—Ernest Kelly.*Proposed expenditures, 1914-15.*—\$7,000 (dairy industry).**Total Market Milk Investigations, \$23,450** (statutory, \$600; dairy industry, 22,850).**DAIRY DIVISION EXPERIMENT FARM.****Supervision:***Object.*—Supervision of all work in dairying at the bureau experiment station.*Location.*—Beltsville, Md.*Date begun.*—1910.*Assignment.*—T. E. Woodward.*Proposed expenditures, 1914-15.*—\$4,900 (dairy industry, \$4,000; statutory, \$900).**Breeding, Feeding, Housing, and Care of Dairy Cattle:***Object.*—To operate a dairy producing sanitary milk; conduct feeding and breeding investigations.*Location.*—Beltsville, Md.*Date begun.*—1910.*Results.*—Breeding work is conducted with scrub cows and pure-bred Guernsey and Holstein bulls. A comparison is being made of open and closed barns for dairy cows; calf-feeding experiments conducted; wood and concrete silos compared, etc.*Assignment.*—T. E. Woodward, W. E. Turner, and R. H. Shaw.*Proposed expenditures, 1914-15.*—\$18,660 (dairy industry).**Feed Production:***Object.*—To grow feed for the dairy herd; includes expense of farm machinery, drainage, and other improvements of land and roads.*Location.*—Beltsville, Md.*Date begun.*—1910.*Results.*—Enough hay and silage has been grown for the dairy herd and the mules; land improved by the application of manure, lime, and green-manuring crops; one-half mile new road completed, and 16,000 feet drainage tile laid; records of cost of operation, etc., kept.*Assignment.*—W. R. Hale.*Proposed expenditures, 1914-15.*—\$7,500 (dairy industry).**Construction of Buildings:***Object.*—To construct such buildings as are required for conducting breeding, feeding, and dairy-farming investigations.*Location.*—Beltsville, Md.*Date begun.*—1911.*Results.*—A concrete cow barn, a small milk house, three silos, and a herdsman's cottage have been built; water, light, and a sewer system installed; a building for offices and laboratories nearly completed. It is planned to equip office and laboratory building, remodel east wing of cow barn, and build cow shed and 15,000-gallon water reservoir.*Assignment.*—O. D. Howell.*Proposed expenditures, 1914-15.*—\$9,970 (construction of building, \$8,250; statutory, \$1,720).**Total, Dairy Division Experiment Farm, \$41,030** (statutory, \$2,620; dairy industry, \$30,160; construction of buildings, \$8,250).

## WESTERN DAIRY INVESTIGATIONS.

**Supervision:**

*Object.*—General supervision of western dairy investigations, including clerical work, general correspondence, etc.

*Location.*—Salt Lake City, Utah.

*Date begun.*—1911.

*Assignment.*—J. E. Dorman.

*Proposed expenditures, 1914-15.*—\$4,360 (dairy industry, \$3,280; statutory, \$1,080).

**Dairy Farming Work:**

*Object.*—Introducing, developing, and improving the business of dairying in the Western States; increasing the average production of dairy cows, etc. Aid will be given in building silos, barns, milk houses, etc.; dairymen will be urged to keep records, and join cow-testing associations; instructions given on feeding and care of dairy cows.

*Cooperation.*—Agricultural colleges of States named under "Location."

*Location.*—Utah, Colorado, North Dakota, Idaho, and Oregon.

*Date begun.*—1908.

*Results.*—One section in Idaho bought 4,000 dairy cows last year; 62 silos built; 3 cow-testing associations and 2 bull associations formed.

*Assignment.*—J. E. Dorman.

*Proposed expenditures, 1914-15.*—\$23,090 (dairy industry).

**Market Milk Work:**

*Object.*—Investigation of city milk supplies of Western States; educational work among dairymen and milk handlers.

*Cooperation.*—State and city boards of health.

*Location.*—Western United States.

*Date begun.*—1912.

*Results.*—Milk and cream contests have served to point out defective methods of production. Complete economic surveys have been made of several city milk plants.

*Assignment.*—F. H. Bothell.

*Proposed expenditures, 1914-15.*—\$2,800 (dairy industry).

**Dairy Manufacturing Work:**

*Object.*—A study of creamery conditions; educational work to introduce better methods and secure a uniformly good product.

*Cooperation.*—Creameries and cheese factories throughout the United States.

*Location.*—Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Washington, Oregon, California.

*Date begun.*—1912.

*Results.*—Creamery conditions were found to be bad, poor records kept, and quality of butter very variable. Assistance by correspondence and personal visits has resulted in a marked improvement. A system of creamery records will be introduced, monthly butter-scoring contests established and assistance given in properly equipping creameries and obtaining a good product.

*Assignment.*—G. E. Frevert.

*Proposed expenditures, 1914-15.*—\$2,620 (dairy industry).

**Total, Western Dairy Investigations,** \$32,870 (statutory, \$1,080; dairy industry, \$31,790.)

**Total, Dairy Investigations,** \$287,080 (statutory, \$22,340; dairy industry, \$256,490; construction of buildings, \$8,250.

## ANIMAL HUSBANDRY INVESTIGATIONS.

## ADMINISTRATION.

**Administration:**

*Object.*—This provides for the general administration of work in the Animal Husbandry Division. Such office expenses as are not directly chargeable to specific projects come under this head, such as the purchase of office supplies, furniture, etc.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Assignments.*—George M. Rommel.

*Proposed expenditures, 1914-15.*—\$13,880 (animal husbandry, \$9,000; statutory, \$4,880).

## ANIMAL BREEDING INVESTIGATIONS.

**Animal Breeding Investigations:**

*Object.*—Study of the principles of animal breeding by the use of small animals; most attention to date paid to inbreeding.

*Location.*—Experimental Farm, Beltsville, Md.

*Date begun.*—1906.

*Results.*—Guinea pigs have been inbred, full litter brother and sister, for as much as 14 generations. A few monstrosities and a measurable decrease in birth weight, size, and vitality have been noticed, but fecundity has apparently increased.

*Assignment.*—An animal husbandman to carry on this work has not been appointed; in the meantime, Mr. Marshall, who is an acknowledged authority on animal breeding, is giving oversight, in addition to his other duties.

*Proposed expenditures, 1914-15.*—\$9,900 (animal husbandry, \$9,000; statutory, \$900).

## ANIMAL NUTRITION INVESTIGATIONS.

**Animal Nutrition Investigations:**

*Object.*—Study of the nutrition of beef cattle by means of the respiration calorimeter.

*Cooperation.*—Pennsylvania State College.

*Location.*—State College, Pa.

*Date begun.*—1898.

*Results.*—The nutritive values of timothy and clover hay and corn meal have been determined; also the influence of age and breeding on the nutrition of beef cattle. Accumulated results are being compiled.

*Assignment.*—H. P. Armsby.

*Proposed expenditures, 1914-15.*—\$3,500 (animal husbandry).

## BEEF AND PORK PRODUCTION INVESTIGATIONS.

**Swine Investigations:**

*Object.*—Studies in feeding swine, particularly the use of forage crops and the effects of such crops and other feeds on the quality of meat, including investigations of the effect of certain rations upon the development of the muscular and bony structures as well as the chemical composition of various portions of the vital organs of swine. A study of methods of curing meats may also be made.

*Location.*—Washington, D. C., and Beltsville, Md.

*Date begun.*—1911.

*Results.*—Several feeding tests have been made during the past three years; results on desiccated sweet potatoes especially promising. Three experiments have been conducted to determine the effects of feeding various iron salts to prevent cottonseed-meal poisoning.

*Assignment.*—W. F. Ward.

*Proposed expenditures, 1914-15.*—\$6,350 (animal husbandry).

**Southern Beef Production:****(a) BEEF PRODUCTION IN THE GULF STATES—**

*Object.*—To determine economy of beef production in Gulf States; best methods of raising and fattening cattle.

*Cooperation.*—Mississippi Experiment Station.

*Location.*—Mississippi.

*Date begun.*—1904.

*Results.*—This work has been located in Sumter County, Ala., since 1907. It has demonstrated that beef cattle can be raised on grass in summer at less than 5 cents per pound gain. In winter feeding, the best results have been obtained with a ration of which silage composes a part, the cost of gain running in some cases below 7 cents per pound. Results obtained in the southern beef-production work will be used to follow the tick eradication work and to instruct the farmers in the best methods for that section.

*Assignment.*—S. S. Jerdan.

*Probable expenditures 1914-15.*—\$6,650 (statutory, \$900; animal husbandry, \$5,750).

**Southern Beef Production—Continued.****(b) WINTERING BEEF CATTLE IN WESTERN NORTH CAROLINA—**

*Object.*—To make an experimental study of various methods of wintering and fattening beef cattle in Western North Carolina.

*Cooperation.*—North Carolina Experiment Station.

*Location.*—Haywood County, N. C.

*Date begun.*—1913.

*Results.*—Two lots of beef cattle were used during the past winter in comparing corn silage with dry feed for fattening steers in the dry lot. Four lots of cattle were used in studying economical methods of wintering stocker cattle. Feeding on pasture is being practiced at the present time.

*Assignment.*—F. T. Peden.

*Probable expenditures, 1914-15.*—\$1,200 (animal husbandry).

**(c) EXTENSION WORK IN BEEF-CATTLE PRODUCTION—**

*Object.*—To stimulate an increased interest in the raising of beef cattle; to assist in organizing county live-stock associations, encourage community breeding of stock, and advise with the farmers on various problems pertaining to the beef-cattle industry.

*Cooperation.*—North Carolina Experiment Station; Farmers' Cooperative Demonstration Work, Bureau of Plant Industry; and all other interested bodies.

*Location.*—Headquarters at Raleigh, N. C. It is proposed to conduct this work in all counties in North Carolina which manifest much interest in the raising of beef cattle.

*Date begun.*—July 1, 1914.

*Probable expenditures, 1914-15.*—\$3,000 (animal husbandry).

**(d) BEEF PRODUCTION IN THE APPALACHIAN REGION—**

*Object.*—To study methods of raising, wintering, and fattening beef cattle economically in the Appalachian region.

*Cooperation.*—West Virginia Experiment Station.

*Location.*—Not definitely decided.

*Date begun.*—1914.

*Results.*—A survey of the State of West Virginia is being made to determine the status of the beef-cattle industry, and to locate a suitable farm for the conduct of the experimental work.

*Assignment.*—J. B. Huyett.

*Probable expenditures, 1914-15.*—\$1,800 (animal husbandry).

**Live-Stock Transportation:**

*Object.*—To study loss in weight of live stock in transit, and to study methods of improving conditions surrounding live-stock shipments.

*Cooperation.*—Various railroads and stockyards companies throughout the United States.

*Location.*—Headquarters at Washington, D. C.

*Date begun.*—1910.

*Results.*—Two years' work has been written up for publication. The study of the loss in weight of beef cattle in transit covering the Southwest, Northwest, and the corn belt will show that cattle shrank in weight from 3 to 5 per cent from live weight under varying conditions. The shrinkage in weight in hogs was found to be  $\frac{1}{2}$  to  $1\frac{1}{2}$  per cent of weight at point of origin.

*Assignment.*—W. F. Ward.

*Probable expenditures, 1914-15.*—\$1,400 (animal husbandry).

**Live-Stock Production on Reclamation Projects:**

*Object.*—To study conditions existing on irrigation projects which might have economic bearing upon production of swine, cattle, and sheep; also problems entailed in raising, wintering, and fattening for market various classes of live stock; to carry on demonstrational and educational work among farmers. Cooperative buying of live stock for breeding purposes and community breeding will be urged. Live-stock agent will assist in selecting and purchasing animals to be used in the work. Records will be secured showing cost of raising, cost of wintering, daily gains, cost of gains, profit on business, etc.

*Cooperation.*—With Bureau of Plant Industry and other officials of the department appointed by the Secretary to handle this subject.

*Location.*—Scottsbluff, Nebr., and other places on reclamation projects.

*Date begun.*—1914.

*Results.*—General survey of the North Platte project; record to be kept of farmers who wish to secure live stock and carry on feeding tests, etc., under the supervision of the live-stock agent.

**Live-Stock Production on Reclamation Projects—Continued.**

*Assignment.*—C. S. Jones.

*Probable expenditures, 1914-15.*—Paid from specific appropriation "Demonstrations on reclamation projects." (See program for Demonstrations on Reclamation Projects.)

**Pig Clubs:**

*Object.*—The organization of pig clubs similar to the poultry clubs, corn clubs, and canning clubs, to encourage the raising of hogs by the boys and girls on the farms, particularly in the South, by these means to increase the extent of the hog industry and to encourage young people to take an interest in farm affairs.

*Cooperation.*—Farmers' Cooperative Demonstration Work of the Bureau of Plant Industry and State Agricultural Colleges.

*Location.*—Louisiana, Alabama, Georgia, Kentucky, Mississippi, North Carolina, and probably Texas, Indiana, and Nebraska.

*Date begun.*—1912.

*Results.*—2,500 members in Louisiana, 1,980 members in Alabama, and 941 members in Georgia.

*Assignment.*—W. F. Ward, in charge; W. H. Balis, in charge, Alabama; J. E. Downing, in charge, Georgia. Agents for other States to be appointed soon.

*Probable expenditures, 1914-15.*—\$16,500 (animal husbandry).

**Total, Beef and Pork Production Investigations, \$36,900 (animal husbandry, \$36,000; statutory, \$900).**

**CERTIFICATION OF PEDIGREES.****Certification of Animals Imported for Breeding Purposes:**

*Object.*—To determine the purity of breeding of horses, dogs, and cats imported for breeding purposes under the provisions of paragraph 397 of the Tariff Act of October 3, 1913.

*Location.*—United States.

*Date begun.*—1911.

*Results.*—During the calendar year 1913, 2,997 horses, 2,024 cattle, 817 sheep, 29 hogs, 593 dogs, and 24 cats were imported, for which certificates of pure breeding were issued. As the Tariff Act of October 3, 1913, provides for the entry free of duty of all cattle, sheep, and swine, certificates of pure breeding are no longer issued by this Bureau for those classes. American buyers of imported animals are now guaranteed that animals alleged to be imported are as represented.

*Assignment.*—G. Arthur Bell.

*Probable expenditures, 1914-15.*—\$6,980 (animal husbandry, \$5,980; statutory, \$1,000).

**ANIMAL HUSBANDRY EXPERIMENT FARM.****Animal Husbandry Experiment Farm:**

*Object.*—To furnish facilities for the continuation of investigations in the feeding and breeding of farm animals, including poultry. A senior animal husbandman is in charge of the farm and ranks the same as those in charge of definite projects of investigational work, although he has no direct connection with any research work.

*Location.*—Beltsville, Md.

*Date begun.*—1911.

*Results.*—Seven buildings have been erected; paddocks have been finished and roads built. No animal husbandry results expected from the farm per se; results are obtained under direction of men in charge of other projects.

*Assignment.*—E. L. Shaw.

*Probable expenditures, 1914-15.*—\$28,830 (animal husbandry, \$18,000; statutory, \$2,580; construction of buildings, \$8,250).

**HORSE AND MULE INVESTIGATIONS.****Army Horse Breeding:**

*Object.*—To encourage the production of horses suitable for military purposes in localities where such horses are the most profitable type for the farmer to produce, and to encourage, in general, better horse-breeding methods among farmers.

*Cooperation.*—War Department.

*Location.*—Vermont, New Hampshire, Virginia, Kentucky, Tennessee, West Virginia.

*Date begun.*—1912.

**Army Horse Breeding—Continued.**

*Results.*—Forty-three stallions in service during the 1914 spring-breeding season; 42 stallions stood during the 1913 season; 1,579 mares bred, or an average of 37½ per stallion. It is thought that this work will have a decided effect upon horse breeding in general.

*Assignment.*—G. Arthur Bell in charge; W. F. Hammond, in charge of 1st district; H. H. Reese, in charge of 2d district; R. G. Lawton, in charge of 3d district.

*Probable expenditures, 1914-15.*—\$32,800 (Army horse breeding, \$30,000; statutory, \$2,800).

**Carriage Horse Breeding:**

*Object.*—To produce a breed of horses from American material suitable for carriage and general purposes.

*Cooperation.*—Colorado Experiment Station.

*Location.*—Fort Collins, Colo.

*Date begun.*—1904.

*Results.*—The type is being reproduced and stallions are being sent out from the station throughout the State. Three stallions bred at the station have been sent out for the 1914 spring season; one is at Akron, Colo., one at Falcon, Colo., and one at Rock Springs, Wyo.

*Assignment.*—W. P. Little.

*Probable expenditures, 1914-15.*—\$7,020 (animal husbandry).

**Morgan Horse Breeding:**

*Object.*—The regeneration of the Morgan horse.

*Cooperation.*—Vermont Experiment Station.

*Location.*—Middlebury, Vt.

*Date begun.*—1907.

*Results.*—The Morgan Horse Farm is quite fully equipped, and the work is showing that the Morgan breed did not die out entirely and can be restored and improved. Surplus stallions are being sent out and used in horse breeding in Vermont and New Hampshire. Six of the stallions bred at the farm have been sent to various parts of Vermont and New Hampshire for the 1914 season. This project has now reached the point where it is possible to dispose of some females each year as registered mares, which means that the average will be raised rapidly from now on.

*Assignment.*—W. F. Hammond.

*Probable expenditures, 1914-15.*—\$17,000 (animal husbandry, \$16,100; statutory, \$900).

**Horse and Mule Feeding:**

*Object.*—(a) To study the economy of feeding and raising horses in the tidewater section of Maryland; (b) to compare the relative economy of feeding and raising horses and mules.

*Location.*—Beltsville, Md.

*Date begun.*—1912.

*Results.*—This project began with the purchase of 20 horse colts and 20 mule colts.

For the past two winters half of the colts have been carried through the winter on silage with little or no corn, to compare this ration with a hay and grain ration. During the past summer one lot was carried through on pasture alone and the other on pasture and a fair amount of grain. Results will probably be most useful to the department in advising farmers in the South as to the best type of work animal to be used on their farms. The results will also give information regarding the differences in the cost of raising horse and mule colts and the difference in value of colts raised on a heavy and a light ration, and the cost.

*Probable date of completion.*—1916.

*Assignment.*—G. Arthur Bell.

*Probable expenditures, 1914-15.*—\$5,000 (animal husbandry).

**Gray Draft-Horse Breeding:**

*Object.*—The establishment of a breed of gray American draft horses by uniting the best qualities of Clydesdale and English Shire horses.

*Cooperation.*—Iowa Experiment Station.

*Location.*—Ames, Iowa.

*Date begun.*—1907.

*Results.*—Considerable progress has been made and a large number of the progeny are gray; of those which are not gray, bay predominates.

*Assignment.*—C. F. Curtiss.

*Probable expenditures, 1914-15.*—No allotment; work depends on obtaining support from other projects.

**Breeding Horses on Indian Reservations:**

*Object.*—To improve the quality of horses bred on Indian reservations by proper selection and use of pure-bred stallions.

*Cooperation.*—Interior Department and War Department.

*Location.*—Cheyenne River Agency, S. Dak.

*Date begun.*—1913.

*Results.*—Preliminary steps were taken in 1913 by the purchase of 4 light (2 standard bred and 2 saddle bred) and of 4 draft (Percheron) stallions and of 4 draft (Percheron) mares. These animals were purchased with money from the tribal funds of the Indians.

*Assignment.*—R. H. Treacy.

*Probable expenditures, 1914-15.*—\$900 (animal husbandry).

**Total, Horse and Mule Investigations,** \$62,720 (animal husbandry, \$29,020; statutory, \$3,700; Army horse breeding, \$30,000).

**POULTRY INVESTIGATIONS.****Improvement of the Farm Egg:**

*Object.*—To study the conditions surrounding the production of the market egg from the farm to the country store, with a view to improving the egg output of the United States and preventing loss now occurring on account of careless methods of handling.

*Cooperation.*—State boards of health, State agricultural colleges, farmers, railroads, and country store merchants.

*Location.*—United States.

*Date begun.*—1908.

*Results.*—B. A. I. Circular 140 contains the results of a general survey. B. A. I. Bulletin 141 gives in detail methods employed in handling the product and factors influencing quality of eggs produced on the farm. B. A. I. Bulletin 160 shows the superior keeping qualities of infertile as compared with fertile eggs. The egg placard of the department shows this in a graphic way. Farmers' Bulletin 528 gives practical information on poultry raising.

*Assignment.*—Harry M. Lamon.

*Probable expenditures, 1914-15.*—\$5,900 (poultry feeding and breeding, \$5,000; statutory, \$900).

**Incubation:**

*Object.*—To study the problems underlying the incubation of eggs, both by natural and artificial means.

*Cooperation.*—Office of Experiment Stations.

*Location.*—Beltsville, Md., and Washington, D. C.

*Date begun.*—1913.

*Results.*—Records have been kept of the daily temperature of sitting hens during the period of incubation and the daily weight of eggs during this period, daily position of eggs in the nest, etc.

*Probable expenditures, 1914-15.*—\$1,200 (poultry feeding and breeding).

**Poultry Clubs:**

*Object.*—The organization of boys' and girls' poultry clubs similar to the canning, corn, and pig clubs, which are so well known. Through these clubs it is proposed to demonstrate the practicability of poultry production in sections where it is not now carried on extensively and to improve the quality of the output of the farm.

*Cooperation.*—Farmers' Cooperative Demonstration Work and the Office of Farm Management of the Bureau of Plant Industry, agricultural colleges, experiment stations, poultry and egg shipping associations, and breeders of standard-bred poultry.

*Location.*—Various Southern States.

*Date begun.*—1912.

*Results.*—In 1913 nine clubs had been organized in two Virginia counties, numbering 104 children. B. A. I. Circular 208 was published outlining this work. This has been revised and published as Farmers' Bulletin 562. The work was also started in South Carolina in December, 1913; in North Carolina in January, 1914; in Tennessee in February, 1914; and in Kentucky in February, 1914.

*Assignment.*—Harry M. Lamon.

*Probable expenditures, 1914-15.*—\$10,000 (poultry feeding and breeding).

**Poultry Feeding:**

*Object.*—(a) To study the cost of buying, fattening, and dressing chickens and hens under commercial conditions; (b) to compare the efficiency of various fattening rations, including the operation of poultry fattening stations; (c) the selection of birds for fattening; (d) to compare the cost of various farm rations for poultry, the advantage of the different methods of handling, and the effect of such rations, including the cost of egg production.

*Cooperation.*—Various packing companies throughout the country having feeding stations, State experiment stations, agricultural colleges, and farmers.

*Location.*—General.

*Date begun.*—1910.

*Results.*—B. A. I. Bulletin 140 shows that the cost of poultry feeding at various plants varies from 6.45 cents per pound gain in one case to 7.74 cents in another. The cost of both feed and labor to produce a pound of gain averaged 7.85 cents in one case and 10.33 cents in another, the average cost being 9.09 cents per pound gain, including cost of feed and labor. Department Bulletin 21 continues and enlarges the work described in B. A. I. Bulletin 140. One year's work at Beltsville, Md., has been completed with several pens on various rations. Other pens were added in 1913.

*Assignment.*—Alfred R. Lee.

*Probable expenditures, 1914-15.*—\$2,000 (poultry feeding and breeding).

**Poultry Breeding:**

*Object.*—(a) To produce first-class individuals of leading breeds of farm poultry to be used in poultry investigations of the division at the Beltsville farm; (b) to determine the possibility of producing high-class specimens of Barred Plymouth Rocks by single mating; (c) to establish a breed with the long type of body similar to the Dorking, having four toes and yellow skin, and which shall lay a white-shelled egg; (d) to study what influence the male and female have in transmitting egg-laying qualities to their offspring, and to work out methods that can be used to increase the laying qualities and the size of the eggs of the average flock.

*Location.*—Beltsville, Md.

*Date begun.*—1912.

*Results.*—Male birds of the different classes are being produced; no results yet obtained upon the single mating of the Barred Plymouth Rocks; two generations of the Dorking-Leghorn-White Plymouth Rock cross obtained.

*Assignment.*—Harry M. Lamon.

*Probable expenditures, 1914-15.*—\$4,340 (poultry feeding and breeding \$3,500; statutory, \$840).

**Preservation of Eggs in Water Glass:**

*Object.*—To test the value of sodium silicate in the different strengths for preserving eggs, as well as to compare the keeping qualities of eggs kept under different conditions.

*Location.*—Beltsville, Md.

*Date begun.*—1913.

*Results.*—Best results secured in 10 per cent solution; one of 7.5 per cent almost as good. Eggs put into solution when fresh kept better than stale eggs; infertile eggs kept better than fertile; washed eggs kept as well as those not washed. Eggs preserved in this way were as good as, if not better than, the average eggs bought from markets in winter time, but were not equal to strictly fresh eggs.

*Assignment.*—Alfred R. Lee.

*Probable expenditures, 1914-15.*—\$300 (poultry feeding and breeding).

**Ostrich Investigations:**

*Object.*—To study the problems underlying the breeding, incubation, and feeding of ostriches in the United States; to study the diseases and climatic conditions affecting them; and to study the marketing of the feathers.

*Cooperation.*—Arizona Ostrich Breeders' Association.

*Location.*—New York, N. Y., and farms near Phoenix, Ariz.

*Date begun.*—1913.

*Results.*—This work was begun by making a study of grading and marketing feathers in New York, N. Y. In January, 1914, several matings of different varieties of ostriches were made. The birds are being fed different rations to determine what effect feeding has upon the improvement in the quality of the feathers produced.

*Assignment.*—Harry M. Lamon.

*Probable expenditures, 1914-15.*—\$2,500 (poultry feeding and breeding).

**Total, Poultry Investigations, \$26,240 (poultry feeding and breeding, \$24,500; statutory, \$1,740).**

## SHEEP AND GOAT INVESTIGATIONS.

**Breeding Sheep for Fur:**

*Object.*—To determine the possible value for fur of Karakule sheep and their crosses under American conditions.

*Location.*—Beltsville, Md.

*Date begun.*—1911.

*Results.*—Skins have been obtained from lambs by Karakule bucks and out of Barbados, Merino, Cheviot, Cotswold, and Karakule-Barbados ewes. Twenty lambs of three-quarter Karakule and one-quarter Barbados blood are now on hand.

*Assignment.*—F. R. Marshall, L. L. Heller.

*Probable expenditures, 1914-15.*—\$1,900 (statutory, \$900; animal husbandry, \$1,000).

**Crossing Southdown with Barbados:**

*Object.*—To combine the Barbados' remarkable fecundity and tendency to breed in any month with the conformation of the Southdown and to procure data upon the inheritance of prolificacy.

*Location.*—Beltsville, Md.

*Date begun.*—1907.

*Results.*—This work was begun at the Bureau Farm, Bethesda, Md., and transferred in June, 1911, to Experimental Farm, Beltsville, Md. Two generations of these animals have been obtained. The ewes are less prolific than Barbados but more so than Southdowns or the Merinos used at the start.

*Assignment.*—L. L. Heller.

*Probable expenditures, 1914-15.*—\$1,000 (animal husbandry).

**New England Sheep Breeding:**

*Object.*—To maintain a flock of Southdown ewes at the Morgan Horse Farm, Middlebury, Vt., for the purpose of producing bucks for sale to farmers and conducting experiments with the flock in testing the best methods of using forage crops for fattening lambs and maintaining ewes in summer, with a view to encouraging New England farmers to return to the sheep industry.

*Cooperation.*—Vermont Experiment Station.

*Location.*—Middlebury, Vt.

*Date begun.*—1907.

*Results.*—The flock of 60 Southdown ewes is in a flourishing condition, and rams sold to near-by farmers are giving good results.

*Assignment.*—L. L. Heller.

*Probable expenditures, 1914-15.*—\$840 (animal husbandry).

**Range Sheep Breeding:**

*Object.*—To produce a type of sheep for range conditions which will shear a profitable amount of wool of long staple, have good mutton conformation, and stand flocking in large numbers. This work will include the distribution of high-class bucks among the ranches of the West and instruction of sheepmen in the proper methods of handling sheep on the range.

*Location.*—Laramie, Wyo.

*Date begun.*—1906.

*Results.*—Stock used for six years was Rambouillet and Delaine Merino, carefully selected. In the fall of 1912 Cotswold, Lincoln, Leicester, and Romney Marsh rams were introduced. The best ewes in the flock are being bred to Rambouillet bucks, the others being bred to the long-wool bucks.

*Assignment.*—L. L. Heller.

*Probable expenditures, 1914-15.*—\$3,000 (animal husbandry).

**Breeding Milch Goats:**

*Object.*—To develop profitable milk-producing goats. An endeavor will be made to show the practicability of using native American stock in breeding for milk production. The goats in milk will also be used in testing the milk-producing value of various rations. Results of ration tests to be printed for distribution.

*Location.*—Beltsville, Md.

*Date begun.*—1905.

*Results.*—A flock of goats has been bred up from American stock, and these are being crossed with Saanen and Toggenburg bucks. Crossbred does have proved very promising from a milk-producing standpoint.

*Assignment.*—V. O. McWhorter.

*Proposed expenditures, 1914-15.*—\$1,000 (animal husbandry).

**Classification of Wools:**

*Object.*—To study the classification of wool on the leading markets and the requirements of each class; to determine the possibility of adopting a uniform classification of wool; to inform woolgrowers how wool must be handled to bring its full value when sold.

*Location.*—Washington, D. C., Boston, Mass., and the range States.

*Date begun.*—1913.

*Results.*—A collection of wools has been prepared for use in educational work in the field, and will be exhibited in leading wool-producing States; other forms of demonstrations of good practice to be arranged; a bulletin discussing the handling and grades of wool to be issued.

*Assignment.*—L. L. Heller and V. O. McWhorter.

*Proposed expenditures, 1914-15.*—\$10,000 (animal industry).

**Importation of Corriedale Sheep for Breeding Purposes:**

*Object.*—The importation of Corriedale and other promising breeds of sheep for breeding purposes.

*Location.*—Not determined; probably Wyoming.

*Date begun.*—July, 1914.

*Assignment.*—F. R. Marshall.

*Proposed expenditures, 1914-15.*—\$10,000 (animal husbandry).

**Total Sheep and Goat Investigations,** \$19,740 (animal husbandry, \$8,840; statutory, \$900; importation of sheep, \$10,000).

**Total, Animal Husbandry Investigations,** \$207,690 (statutory, \$16,600; construction of buildings, \$8,250; Army horse breeding, \$30,000; poultry feeding and breeding, \$24,500; importation of sheep, \$10,000; animal husbandry \$118,340).

**CONTROL OF THE MANUFACTURE, IMPORTATION, AND SHIPMENT OF VIRUSES, SERUMS, ETC.****Control of Viruses, Serums, etc.:**

*Object.*—Supervision of establishments which manufacture for interstate business viruses, serums, toxins, etc., intended for use in the treatment of domestic animals; also supervision and control of importations of products of this character, with a view to protecting farmers against spurious and dangerous viruses, serums, and analogous products.

*Cooperation.*—Collectors of customs.

*Location.*—Various States, to be selected as may be required.

*Date begun.*—1913.

*Results.*—Work performed during the first 11 months of fiscal year 1914 approximately as follows: Applications for licenses received, 126; inspections made, 273; licenses issued, 81; permits issued, 6; hearings conducted as provided in the law, 2; license suspended, 1; alleged violations of the law and regulations reported to the office of the solicitor, 7.

*Assignment.*—J. R. Mohler, M. Dorset.

*Proposed expenditures, 1914-15.*—\$50,600 (statutory, \$600; control of viruses, etc., \$50,000).

**INSPECTION AND QUARANTINE OF IMPORTED ANIMALS.****Supervision:**

*Object.*—Supervision of the work of inspection and quarantine of imported animals, and the performance of duties common to the whole work.

*Location.*—Washington, D. C.

*Date begun.*—1884.

*Assignment.*—M. Dorset, R. W. Hickman, B. H. Ransom, R. A. Ramsay.

*Proposed expenditures, 1914-15.*—\$5,355 (inspection and quarantine, \$570; statutory, \$2,000; administrative expenses, \$2,785).

**Inspection at Ports of Entry of Animals for Importation from Other than North American Countries:**

*Object.*—To prohibit the importation of diseased animals.

*Cooperation.*—Collectors of customs at ports of entry.

*Location.*—Ports of entry in the States of Massachusetts, New York, Maryland, California, and Washington.

*Date begun.*—1884.

*Results.*—During the first 10 months of the fiscal year 1914 there were 6,036 animals inspected in connection with this work.

**Inspection of Ports of Entry, etc.—Continued.***Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$8,000 (inspection and quarantine, \$7,000; statutory, \$1,000).**Inspection of Animals Imported Across the Mexican Border:***Object.*—To prohibit the importation of diseased animals.*Cooperation.*—Collectors of customs at ports of entry.*Location.*—Ports of entry in Arizona, California, and Texas.*Date begun.*—1884.*Results.*—During the first 10 months of the fiscal year 1914 there were 1,026,024 animals imported across the Mexican border.*Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$21,000 (inspection and quarantine, \$21,000).**Inspection of Animals Imported Across the Canadian Border:***Object.*—To prohibit the importation of diseased animals.*Cooperation.*—Collectors of customs at ports of entry.*Location.*—Ports of entry in Maine, Vermont, New York, Michigan, North Dakota, Montana, and Washington.*Date begun.*—1884.*Results.*—During the first 10 months of the fiscal year 1914 there were 289,149 animals imported across the Canadian border.*Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$35,000 (inspection and quarantine, \$34,500; statutory, \$500).**Inspection and Testing of Animals in Great Britain Intended for Export to the United States:***Object.*—To prohibit the importation of diseased animals.*Cooperation.*—American consuls in Great Britain.*Location.*—Great Britain.*Date begun.*—1900.*Results.*—In the first 10 months of the fiscal year 1914 there were 1,552 cattle tested for exportation to the United States.*Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$5,000 (inspection and quarantine, \$5,000).**Inspection of Animals at Ports of Entry:***Object.*—To prohibit the importation of diseased animals.*Location.*—Turner (Baltimore), Md., Athenia (New York), N. Y., Littleton (Boston), Mass.*Date begun.*—1884.*Results.*—In the first 10 months of the fiscal year 1914 there were 2,968 animals quarantined at these stations.*Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$21,000 (inspection and quarantine, \$18,500; statutory, \$2,500).**Construction of Superintendent's Residence:***Object.*—To provide a residence for the superintendent at the animal quarantine station, Littleton, Mass., in order that the representative of the bureau may be on the premises at all times to guard the animals that may be held in quarantine and to properly protect the Government property against fire and from other danger.*Location.*—Littleton, Mass.; port of entry, Boston, Mass.*Date begun.*—Will be constructed during fiscal year 1915.*Assignment.*—R. W. Hickman.*Proposed expenditures, 1914-15.*—\$3,000 (construction of superintendent's residence).**Investigation of Methods for Disinfecting Hides:***Object.*—To determine the best methods for disinfection of hides, with special reference to anthrax.*Cooperation.*—Bureau of Chemistry.*Location.*—Washington, D. C.*Date begun.*—1912.*Results.*—Indefinite; not completed.*Assignment.*—F. W. Tilly.*Proposed expenditures, 1914-15.*—\$1,600 (inspection and quarantine).**Total, Inspection and Quarantine of Imported Animals, \$99,955 (statutory, \$6,000; inspection and quarantine, \$88,170; construction of superintendent's residence, \$3,000; administration, \$2,785).**

**EXPORT LIVE-STOCK INSPECTION.****Supervision:**

*Object.*—Supervision of all work connected with export live-stock inspection and the performance of duties common to the whole work.

*Location.*—Washington, D. C.

*Date begun.*—1891.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$1,700 (inspection and quarantine, \$200; administrative expenses, \$500; statutory, \$1,000).

**Inspection of Vessels Carrying Export Animals:**

*Object.*—To provide for the safe transportation and humane treatment of export live stock.

*Location.*—Ports of export in the States of Maine, New York, Maryland, South Carolina, Louisiana, Washington, Massachusetts, Pennsylvania, Virginia, Texas, and California.

*Date begun.*—1891.

*Results.*—During the first 10 months of the fiscal year 1914, there were 195 vessels inspected in connection with this work.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$2,000 (inspection and quarantine, \$2,000).

**Inspection and Testing of Animals Exported to Foreign Countries:**

*Object.*—To insure freedom of export animals from disease.

*Cooperation.*—Canadian Government.

*Location.*—Bureau stations in the field and such other places as may be required.

*Date begun.*—Several years ago.

*Results.*—During the first 10 months of the fiscal year 1914 there were 79,554 animals tested and inspected for export to foreign countries.

*Assignment.*—R. W. Hickman.

*Proposed expenditures, 1914-15.*—\$2,700 (inspection and quarantine, \$1,500; meat inspection, \$1,000; statutory, \$200).

**Total, Export Live-Stock Inspection, \$6,400** (statutory, \$1,200; inspection and quarantine, \$3,700; administration, \$500; meat inspection, \$1,000).

**INVESTIGATION OF ANIMAL DISEASES.****Supervision:**

*Object.*—Supervision of all the investigations of animal diseases and the performance of duties common to the whole work.

*Location.*—Washington, D. C.

*Date begun.*—1884.

*Assignment.*—M. Dorset, J. R. Mohler, B. H. Ransom, E. C. Schroeder.

*Proposed expenditures, 1914-15.*—\$10,000 (diseases of animals, \$6,000; administrative expenses, \$1,300; statutory, \$2,700).

**Investigation of Rabies:**

*Object.*—The diagnosis of rabies in animals; to ascertain the causative agent of the disease with a view to developing same by laboratory methods; the determination of the significance of Negri bodies and the causation of rabies.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Data in Farmer's Bulletin 444 and B. A. I. Circular 129.

*Assignment.*—J. R. Mohler.

*Proposed expenditures, 1914-15.*—\$2,000 (diseases of animals).

**Serum Diagnosis of Dourine:**

*Object.*—To determine the presence or absence of dourine in suspected animals.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Paper, "The Diagnosis of Dourine by Complement Fixation," in Journal of Agricultural Research; 12,700 suspected cases of dourine diagnosed to date.

*Assignment.*—J. R. Mohler.

*Proposed expenditures, 1914-15.*—\$6,000 (diseases of animals, \$4,000; statutory, \$2,000).

**Investigation of Swamp Fever:**

*Object.*—To determine the nature and cause of the disease and to develop methods for prevention of the same.

*Cooperation.*—Minnesota Agricultural Experiment Station and Minnesota Live Stock Sanitary Board.

**Investigation of Swamp Fever—Continued.**

*Location.*—St. Paul, Minn.

*Date begun.*—1906.

*Results.*—Data in B. A. I. Circular 138.

*Assignment.*—J. R. Mohler.

*Proposed expenditures, 1914-15.*—\$2,000 (diseases of animals).

**Investigations of Trichinosis and Measles and Other Zoological Investigations Relating to Meat Inspection:**

*Object.*—To improve methods of meat inspection in so far as concerns parasitic diseases of food animals.

*Location.*—Washington, D. C., and various meat-inspection stations.

*Date begun.*—1884.

*Results.*—Recent results include discovery of common occurrence of the sheep-measles parasite in United States and life history of this parasite, determination of the effects of refrigeration on the beef-measles parasite, and the fact that freezing sometimes destroys the vitality of trichinæ, and determination of the thermal death point of trichinæ.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$3,000 (meat inspection, \$2,000; statutory, \$1,000).

**Index Catalogue and Collection of Parasites:**

*Object.*—Maintenance of a comprehensive card index to literature on animal parasites and a collection of specimens of parasites for study and reference.

*Cooperation.*—Public Health Service in maintenance of catalogue; National Museum in maintenance of collection of parasites.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—The literature of the entire world on animal parasites is rendered readily available by the index catalogue, which has been partially published in cooperation with the Public Health Service. The collection of parasites is one of the largest in existence and is of great value to the work of the Zoological Laboratory.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$3,000 (diseases of animals, \$2,000; administrative expenses, \$500; statutory, \$500).

**Investigation of Roundworms of Sheep:**

*Object.*—To obtain information relating to these parasites and to develop methods for their control and eradication.

*Location.*—Washington, D. C., and a site in the field to be selected.

*Date begun.*—1906.

*Results.*—The life history of the stomach worm has been worked out, important facts relating to other roundworms determined, and valuable data bearing on the problem of preventing infestation with these parasites collected.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$8,000 (diseases of animals, \$6,500; statutory, \$500; administrative expenses, \$1,000).

**Investigation of Tapeworms of Sheep:**

*Object.*—To collect information relating to these parasites and to develop methods for their control and eradication.

*Location.*—Washington, D. C., Bethesda, Md., and Colorado.

*Date begun.*—1911.

*Results.*—Numerous data bearing on the life history of the fringed tapeworm have been obtained.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$3,000 (diseases of animals, \$2,500; administrative expenses, \$500).

**Investigations Concerning Parasitic Protozoa:**

*Object.*—To collect information relating to these parasites which may be useful in their eradication and control.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Recent results include the discovery of the early stages in the life history of the Sarcosporidia.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$2,000 (statutory, \$300; diseases of animals, \$1,700).

### **Investigations of the Use of Dips in the Treatment of Cattle Ticks, Mange Mites, and Other External Parasites:**

*Object.*—To obtain information necessary to the effective eradication and control of external parasites.

*Location.*—Washington, D. C., and various temporary locations in the field.

*Date begun.*—1908.

*Results.*—Development of the arsenical dip used in tick eradication and various important facts determined in reference to treatment of cattle mange and sheep scab.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$7,000 (statutory, \$500; eradicating cattle ticks, \$1,500; diseases of animals, \$5,000).

### **Miscellaneous Investigations of Animal Parasites, Their Control and Eradication:**

*Object.*—To collect information relative to miscellaneous animal parasites and develop methods for their control and eradication.

*Location.*—Washington, D. C., and various temporary locations in the field.

*Date begun.*—1887.

*Results.*—Recent results include determination of the transmission of a certain parasite of the horse by the house fly, transmission of certain parasites of cattle and sheep by dung beetles, successful treatment of horses for bots and certain other parasites, and the collection of important data relative to the efficacy of various fly repellents used on live stock.

*Assignment.*—B. H. Ransom.

*Proposed expenditures, 1914-15.*—\$3,000 (statutory, \$1,000; diseases of animals, \$2,000).

### **Investigation of Bovine Tuberculosis:**

*Object.*—To gain further knowledge for use in the control and eradication of bovine tuberculosis and of tuberculosis among other animals.

*Location.*—Bureau Experiment Station, Bethesda, Md.

*Date begun.*—1884.

*Results.*—Increased knowledge of the mode of infection with tubercle bacilli, the mode of dissemination, the main cause of hog tuberculosis, etc.

*Assignment.*—E. C. Schroeder, W. E. Cotton, G. W. Brett.

*Proposed expenditures, 1914-15.*—\$11,000 (statutory, \$2,000; diseases of animals, \$9,000).

### **Investigation of Infectious Abortion:**

*Object.*—To gain further knowledge regarding the treatment, control, and possible eradication of abortion disease among cattle and other animals.

*Location.*—Bureau Experiment Station, Bethesda, Md.

*Date begun.*—About 1908.

*Results.*—Demonstrated that the bacillus of infectious abortion is of common occurrence in the milk of infected cows; that the bacillus may occur in the milk of infected cows before they have aborted, and that the bacillus seems remarkably resistant to natural germ-destroying agencies.

*Assignment.*—E. C. Schroeder, W. E. Cotton, G. W. Brett.

*Proposed expenditures, 1914-15.*—\$8,000 (statutory, \$1,500; diseases of animals, \$6,500).

### **Subsistence and Care of Animals Used in Disease Research:**

*Object.*—To provide animals for use in conducting various special investigations in disease research.

*Location.*—Bureau Experiment Station, Bethesda, Md.

*Date begun.*—1897.

*Assignment.*—E. C. Schroeder, W. E. Cotton, G. W. Brett.

*Proposed expenditures, 1914-15.*—\$5,000 (statutory, \$500; diseases of animals, \$4,500).

### **Breeding and Feeding Small Experiment Animals for Disease Research:**

*Object.*—To have available a sufficient number of small experiment animals of definite known history for the various investigations conducted by the several divisions of the bureau.

*Location.*—Bureau Experiment Station, Bethesda, Md.

*Date begun.*—1897.

*Assignment.*—E. C. Schroeder, W. E. Cotton, G. W. Brett.

*Proposed expenditures, 1914-15.*—\$7,000 (statutory, \$4,000; diseases of animals, \$3,000).

**General Maintenance of Experiment Station:**

*Object.*—This represents overhead charges incidental to the maintenance and upkeep of the buildings, fences, and equipment at the experiment station, together with the planting and harvesting of crops and other miscellaneous expenses incurred in connection with running the farm, which items can not be segregated and charged against any other projects.

*Location.*—Bethesda, Md.

*Date begun.*—1897.

*Assignment.*—E. C. Schroeder.

*Proposed expenditures, 1914-15.*—\$16,000 (statutory, \$5,840; diseases of animals, \$10,160).

**Miscellaneous Cooperative Disease Research:**

*Object.*—This represents numerous investigations which are conducted partly at the experiment station and partly in the bureau laboratories in Washington, D. C.

*Location.*—Experiment station, Bethesda, Md., and Washington, D. C.

*Date begun.*—1884.

*Assignment.*—B. H. Ransom, J. R. Mohler.

*Proposed expenditures, 1914-15.*—\$11,000 (statutory, \$3,500; diseases of animals, \$7,500).

**Miscellaneous Special Disease Research:**

*Object.*—This represents numerous independent minor investigations conducted at the Bethesda Experiment Station as may be required from time to time.

*Location.*—Experiment station, Bethesda, Md.

*Date begun.*—1897.

*Results.*—During the fiscal year 1914 this work has covered experiments in the study of germicides, Texas fever, testing of tuberculin, and other miscellaneous subjects relating to animal diseases.

*Assignment.*—E. C. Schroeder.

*Proposed expenditures, 1914-15.*—\$3,000 (diseases of animals).

**Total, Investigation of Animal Diseases,** \$110,000 (statutory, \$25,840; eradication of cattle ticks, \$1,500; diseases of animals, \$77,360; administrative, \$3,300; meat inspection, \$2,000).

**ENFORCEMENT OF THE 28-HOUR LAW.****Enforcement of the 28-Hour Law:**

*Object.*—To ascertain whether animals being shipped interstate have been unloaded for feeding, resting, and watering at such periods as required by law; also to ascertain whether the animals have been handled in a humane manner at stockyards where such unloading is performed.

*Cooperation.*—Attorney General, Solicitor of the department, and various transportation companies and shippers of live stock.

*Location.*—Washington, D. C., and 80 cities, more or less, throughout the United States.

*Date begun.*—1906.

*Results.*—In the fiscal year of 1913 there were submitted to the Solicitor of the department 1,087 cases of alleged violation of the 28-hour law; the fines imposed in the cases decided in favor of the Government amounted to \$57,719.24.

*Assignment.*—R. A. Ramsay, W. P. Ellenberger.

*Proposed expenditures, 1914-15.*—\$20,000 (statutory, \$2,300; inspection and quarantine, \$17,700).

**INVESTIGATION, TREATMENT, AND ERADICATION OF HOG CHOLERA.****Supervision:**

*Object.*—Supervision of all work connected with hog cholera investigations and eradication, and the performance of duties common to the work as a whole.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Assignment.*—M. Dorset.

*Proposed expenditures, 1914-15.*—\$6,500 (hog cholera, \$5,500; statutory, \$1,000).

**Demonstrational and Educational Work.**

*Object.*—To demonstrate to farmers the means by which they may, by their own efforts, reduce losses from hog cholera.

*Cooperation.*—Bureau of Plant Industry; State agricultural college or other State institution in the State in which the work is conducted.

*Location.*—About 30 States, to be selected, including the principal hog-raising States.

*Date begun.*—Work being organized at the present time.

*Results.*—None so far.

*Assignment.*—M. Dorset and U. G. Houck.

*Proposed expenditures, 1914-15.*—\$125,000 (hog cholera).

**County Control Investigations:**

*Object.*—To demonstrate the practicability of eradicating hog cholera from selected areas (counties), and to determine the most effective methods of work.

*Cooperation.*—Appropriate State officials in each State where the work is conducted.

*Location.*—Adel, Iowa; Crawfordsville, Ind.; Beatrice, Nebr.; Sedalia, Mo.; Marysville, Kans.; Coldwater, Mich.; Lima, Ohio; Columbia, Tenn.; Olivia, Minn.; Twin Falls, Idaho; Henderson, Ky.; Kankakee, Ill.; Decatur County, Ga.

*Date begun.*—1913.

*Results.*—Results are gratifying and indicate a marked reduction of losses from hog cholera in the areas under experiment.

*Assignment.*—M. Dorset.

*Proposed expenditures, 1914-15.*—\$217,000 (hog cholera).

**Manufacture of Anti-Hog-Cholera Serum:**

*Object.*—To produce sufficient serum to supply the requirements of the bureau employees engaged in the county hog-cholera control investigations.

*Cooperation.*—Various States will cooperate if the bureau is unable to produce a sufficient quantity of serum.

*Location.*—Ames, Iowa.

*Date begun.*—1913.

*Results.*—Results reflected in the project for county hog-cholera control investigations. Approximately 3,000,000 cubic centimeters of serum were produced at the Ames, Iowa, plant in the first 11 months of the fiscal year of 1914.

*Assignment.*—W. B. Niles.

*Proposed expenditures, 1914-15.*—\$70,000 (hog cholera, \$67,500; statutory, \$2,500).

**Total, Investigation, Treatment, and Eradication of Hog Cholera, \$418,500** (statutory, \$3,500; hog cholera, \$415,000).

**BUREAU OF PLANT INDUSTRY.****GENERAL BUREAU ADMINISTRATION.****Office of Chief:**

*Object.*—The effective administration of the affairs of the Bureau of Plant Industry and general direction of all of its investigational activities.

*Cooperation.*—Other offices of the department; other departments; State experiment stations.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—William A. Taylor, L. C. Corbett.

*Proposed expenditures, 1914-15.*—\$37,580 (general expenses, \$15,150; statutory, \$22,430).

**Office of Chief Clerk:**

*Object.*—General supervision of clerical force and janitor service of bureau; handling mail; operation and maintenance of central file and property room; all matters pertaining to appointments, pay rolls, and leaves of absence.

*Cooperation.*—Other offices of department and other departments.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—James E. Jones, F. E. Meloy, F. S. Moise.

*Proposed expenditures, 1914-15.*—\$45,330 (general expenses, \$10,200; statutory, \$35,130).

**Editorial Office:**

*Object.*—To edit and prepare for printing manuscripts and proofs of articles submitted for publication by investigators of the bureau.

*Cooperation.*—Other bureaus of the department and Division of Publications.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—J. E. Rockwell.

*Proposed expenditures, 1914-15.*—\$8,847 (general expenses, \$357; statutory, \$8,490).

**Office of Records:**

*Object.*—The systematic administration of the fiscal affairs of the bureau.

*Cooperation.*—Disbursing office of the department; the Treasury Department.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—W. P. Cox.

*Proposed expenditures, 1914-15.*—\$19,281 (general expenses, \$3,621; statutory, \$15,660).

**Bureau Library:**

*Object.*—To circulate and care for books and periodicals in the bureau; keep records of books bought with bureau funds for field use; indexing, reference, and bibliographical work, including the preparation of bibliographies for use in bureau bulletins; translating and abstracting.

*Cooperation.*—Main department library; Library of Congress; other libraries in and outside of Washington.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—Eunice R. Oberly.

*Proposed expenditures, 1914-15.*—\$7,122 (general expenses, \$3,162; statutory, \$3,960).

**Total, General Bureau Administration,** \$118,160 (general expenses, \$32,490; statutory, \$85,670).

**LABORATORY OF PLANT PATHOLOGY.****Laboratory of Plant Pathology:**

*Object.*—To ascertain the life history of fungi and bacteria parasitic on plants, with a view to the discovery of remedies and methods of preventing diseases caused by them.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Results.*—Causes of many serious diseases determined and remedies suggested; important discoveries made in the crown-gall studies, especially those relating to the analogy between this disease and cancer in animals.

*Assignment.*—Erwin F. Smith.

*Proposed expenditures, 1914-15.*—\$31,730 (general expenses, \$25,850; statutory, \$5,880).

**PATHOLOGICAL COLLECTIONS AND INSPECTION WORK.****Pathological Herbarium:**

*Object.*—To maintain a permanent collection of economic fungi and related species.

*Location.*—Washington, D. C.

*Date begun.*—1885.

*Results.*—Continued acquisition of pathological and mycological specimens by purchase of exsiccata, exchange, authors' contributions of type material, specimens from requested identifications, condemnations from the Federal Horticultural Board inspections, and collections made by the pathological offices of the bureau.

*Assignment.*—Flora W. Patterson.

*Proposed expenditures, 1914-15.*—\$3,595 (general expenses, \$2,995; statutory, \$600).

**Mycological Index and Host Index:**

*Object.*—To provide a file of the specimens comprising the collections; to furnish information relative to occurrence of species, their hosts, parasitism, geographical distribution, relationships, etc.

*Location.*—Washington, D. C.

*Date begun.*—1885.

**Mycological Index and Host Index—Continued.**

*Results.*—These indices have been increased by the addition of many hundreds of cards. The subject matter is not confined to data relative to insertions but provides information pertaining to new species, geographical distribution of species, and various pathological problems. Separate indices are maintained of new genera, with original descriptions or translations and copies of illustrations.

*Assignment.*—Flora W. Patterson.

*Proposed expenditures, 1914-15.*—\$2,820 (general expenses, \$1,980; statutory, \$840).

**Mycological Exchange:**

*Object.*—Assistance to experiment station workers, agricultural colleges having limited equipment, science teachers, and collaborators; acquisition of American or foreign fungous material by exchange.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—This project provides a pathological working collection for comparison or demonstration purposes.

*Assignment.*—Flora W. Patterson.

*Proposed expenditures, 1914-15.*—\$760 (general expenses, \$500; statutory, \$260).

**Work of Identification:**

*Object.*—Identification of fungi with a view to controlling plant diseases.

*Cooperation.*—J. R. Johnston, of Porto Rico, on the identification of sugar-cane fungi.

*Location.*—Washington, D. C.; Porto Rico.

*Date begun.*—1885.

*Results.*—Hundreds of identifications have been made of all classes of fungi in response to requests from experiment station workers, scientists, collaborators, teachers, collectors, mushroom amateurs, and others. Certain rare or interesting species have accrued to the collections as a result of this work.

*Assignment.*—Flora W. Patterson.

*Proposed expenditures, 1914-15.*—\$2,685 (general expenses, \$2,085; statutory, \$600).

**Inspection Work:**

*Object.*—To prevent the introduction and spread of new or foreign plant diseases.

*Cooperation.*—Federal Horticultural Board.

*Location.*—Washington, D. C.; Rockville, Md.

*Date begun.*—1905.

*Results.*—Many dangerous diseases detected and their introduction or spread prevented as result of identification of fungi on imported or domestic stock and the quarantine or condemnation of the material; monthly reports submitted giving list of fungi new or dangerous found present on plant importations.

*Assignment.*—Flora W. Patterson.

*Proposed expenditures, 1914-15.*—\$1,190 (general expenses, \$1,090; statutory, \$100).

**Total, Pathological Collections and Inspection Work, \$11,050** (general expenses, \$8,650; statutory, \$2,400).

**FRUIT-DISEASE INVESTIGATIONS.****OFFICE AND LABORATORY.****Office and Laboratory:**

*Object.*—To handle administrative, clerical, and such laboratory work as pertains more or less to all the other fruit-disease projects.

*Location.*—Washington, D. C.

*Date begun.*—About 1905.

*Assignment.*—M. B. Waite, J. M. Shull, Clara H. Hasse, A. C. Hall.

*Proposed expenditures 1914-15.*—\$7,000 (general expenses, \$3,300; statutory, \$3,700).

**GENERAL ORCHARD DISEASES.****Pear-Blight Investigations:**

*Object.*—To obtain complete knowledge of pear-blight and find a practical method of control.

*Location.*—Washington, D. C., Virginia, Maryland, and Pennsylvania.

*Date begun.*—1889.

*Results.*—A method of control by eradication has been discovered; work practically completed.

*Assignment.*—M. B. Waite, L. M. Hutchins.

*Proposed expenditures 1914-15.*—\$300 (general expenses).

**Pear-Blight Eradication Tests:**

*Object.*—To test and prove methods for eradicating pear-blight; to demonstrate, and instruct orchardists, inspectors, etc., in these methods.

*Cooperation.*—Fruit growers and horticultural inspectors.

*Location.*—Martinsburg, W. Va., and Winchester, Va.

*Date begun.*—1900.

*Results.*—Practical utilization by orchardists of scientific research through publications and demonstrations.

*Assignment.*—M. B. Waite, L. M. Hutchins.

*Proposed expenditures 1914-15.*—\$400 (general expenses).

**Pear-Blight Eradication in California, Oregon, and Washington:**

*Object.*—Practical control of this disease on Pacific coast.

*Cooperation.*—California State Experiment Station and county horticultural commissioners.

*Location.*—Orchard districts in California, Oregon, and Washington.

*Date begun.*—1905.

*Results.*—Saving of pear industry in California, Oregon, and Washington.

*Assignment.*—M. B. Waite, W. S. Ballard.

*Proposed expenditures 1914-15.*—\$500 (general expenses).

**Breeding New Pears and Apples Resistant to Blight:**

*Object.*—To secure new blight-resisting varieties of pears and apples for stocks and for top working.

*Location.*—Arlington, Va., in the vicinity of Washington.

*Date begun.*—1889.

*Results.*—A number of seedlings at Arlington Farm.

*Assignment.*—M. B. Waite.

*Proposed expenditures 1914-15.*—\$300 (general expenses).

**Little Peach and Peach Yellows Investigations:**

*Object.*—To investigate the nature, distribution, and method of control of these diseases.

*Location.*—Washington, D. C., and peach orchards of the United States.

*Date begun.*—1889.

*Results.*—Classification of the peach yellows group and discovery of practical method of control by eradication.

*Assignment.*—M. B. Waite, W. S. Ballard, L. M. Hutchins.

*Proposed expenditures 1914-15.*—\$400 (general expenses).

**Crown-Gall Diseases of Fruits:**

*Object.*—To make available to orchardists results of research; carry on practical tests in growing apple grafts free from gall.

*Cooperation.*—Orchardists and various State and county horticultural inspectors.

*Location.*—Mainly at Washington, D. C.

*Date begun.*—1900.

*Results.*—Important steps toward control in nurseries; digestion of work of other investigators to make results available to growers.

*Assignment.*—M. B. Waite.

*Proposed expenditures 1914-15.*—\$300 (general expenses).

**Pollination of Orchard Fruits:**

*Object.*—To obtain exact knowledge on pollination and fruit-setting problems.

*Location.*—Vicinity of Washington, D. C.

*Date begun.*—1890.

*Results.*—Important discoveries in self-sterility of fruits; improved methods of planting orchards to secure cross-pollination.

*Assignment.*—M. B. Waite.

*Proposed expenditures 1914-15.*—\$300 (general expenses).

**Apple Cankers of the United States:**

*Object.*—To determine cause and remedy for various apple cankers and to study life histories of causative organisms.

*Location.*—Washington, D. C., and apple orchards of various States.

*Date begun.*—1903.

*Results.*—Accumulation of data; practical experience in control.

*Assignment.*—M. B. Waite, Clara H. Hasse, L. M. Hutchins.

*Proposed expenditures 1914-15.*—\$1,000 (general expenses).

**Apple Blackheart:**

*Object.*—To find the cause and remedy for this serious disease of apple orchards and nurseries.

*Location.*—Principally in the middle Western States; laboratory work at Washington, D. C.

*Date begun.*—1903.

*Results.*—Preliminary bacteriological researches; crown-gall germ found associated with the disease.

*Assignment.*—M. B. Waite.

*Proposed expenditures 1914-15.*—\$300 (general expenses).

**Apple and Peach Powdery Mildew:**

*Object.*—To find method of control.

*Cooperation.*—Entomologist of Santa Cruz County, Cal.

*Location.*—Watsonville, Cal.

*Date begun.*—1907.

*Results.*—Practical method of control by spraying with iron sulphid discovered; publication prepared November, 1913.

*Assignment.*—W. S. Ballard.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Japanese Plum Disease:**

*Object.*—To determine cause and remedy.

*Location.*—Mainly laboratory work at Washington, D. C.; diseased orchards, Georgia and Texas.

*Date begun.*—1902.

*Results.*—Preliminary bacteriological investigation.

*Assignment.*—M. B. Waite.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Shot-Hole and Twig-Spot Disease of Peaches and Apricots:**

*Object.*—To find cause and remedy.

*Cooperation.*—Fruit growers.

*Location.*—California.

*Date begun.*—1905.

*Results.*—Spraying remedy found for the peach disease.

*Assignment.*—M. B. Waite; W. S. Ballard.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Root-Rot Diseases of Fruit Trees:**

*Object.*—To ascertain cause, methods of dissemination, and remedy.

*Location.*—Laboratory work at Washington, D. C.; disease all over the United States.

*Date begun.*—1900.

*Results.*—Data and specimens accumulated, but no remedy yet found.

*Assignment.*—M. B. Waite.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Miscellaneous Orchard Diseases:**

*Object.*—To investigate (a) minor orchard diseases not covered in special projects, and (b) new diseases which suddenly assume importance.

*Cooperation.*—Fruit growers.

*Location.*—Washington, D. C., and orchards over the United States.

*Date begun.*—About 1890.

*Results.*—Accumulation of data about special diseases; service rendered to orchardists through correspondence.

*Assignment.*—M. B. Waite and assistants.

*Proposed expenditures, 1914-15.*—\$3,375 (general expenses).

**Nut Diseases:**

*Object.*—To find causes and remedies for various nut diseases and apply control measures.

*Cooperation.*—Nut growers.

*Location.*—Laboratory work, Washington, D. C.; field work mainly in South-western States.

*Date begun.*—1909.

*Results.*—Thorough study of rosette and other pecan diseases; publications on this new subject; paper in Journal of Agricultural Research, "Some Diseases of Pecans."

*Assignment.*—S. M. McMurran.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Fungicides and Spraying Apparatus in Fruit-Disease Investigations:**

*Object.*—To improve fungicides and methods of applying same, in connection with fruit-disease investigations.

*Cooperation.*—Bureau of Entomology, Insecticide and Fungicide Board, orchardists, and manufacturers.

*Location.*—Laboratory work at Washington, D. C.; orchards at various points.

*Date begun.*—1892.

*Results.*—Many improvements in formulæ and methods.

*Assignment.*—M. E. Waite, C. L. Shear, Charles Brooks, and all other members of the force. (This project is open to all investigators as occasion demands in finding remedies for plant diseases.)

*Proposed expenditures, 1914-15.*—\$600 (general expenses).

**Frost Injuries to Fruit Trees:**

*Object.*—To apply pathological methods to study of frost injuries.

*Cooperation.*—Fruit growers and nurserymen.

*Location.*—Laboratory work at Washington, D. C.; orchards at various points.

*Date begun.*—1890.

*Results.*—Better understanding of the injuries and methods of handling frost-injured trees.

*Assignment.*—M. E. Waite.

*Proposed expenditures, 1914-15.*—\$600 (general expenses).

**Total, General Orchard Diseases, \$12,775 (general expenses).**

**SPRAYING DEMONSTRATIONS AND EXPERIMENTS.****Peach and Plum Brown-Rot Investigations:**

*Object.*—To determine life history of the organisms concerned and better means for their control.

*Cooperation.*—Bureau of Entomology.

*Location.*—Georgia, Missouri, Arkansas, Delaware, West Virginia, and Illinois.

*Date begun.*—1904.

*Results.*—Treatment perfected on the peach; efficacious results with other stone fruits; data in Farmers' Bulletin 440.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Spraying Demonstrations for the Control of Apple Diseases:**

*Object.*—To demonstrate in various sections treatment of apple diseases by spraying and to improve and perfect the methods.

*Cooperation.*—Bureau of Entomology and, occasionally, with experiment stations.

*Location.*—Bentonville, Ark.; Benton Harbor, Mich.; and various points in the United States.

*Date begun.*—1906.

*Results.*—Methods of spraying apples perfected; work brought more closely to the fruit grower.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Apple Bitter-Rot Investigations:**

*Object.*—To obtain further information regarding the life history of the fungus, especially as to manner of wintering; to follow up control methods, particularly spraying and eradicating the cankers so as to give success under unfavorable conditions.

*Location.*—Virginia, Arkansas, Missouri, West Virginia, Illinois.

*Date begun.*—1903.

*Results.*—Successful treatment found by late summer spraying with Bordeaux mixture.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Fungicides for the Peach:**

*Object.*—To determine best fungicide for control of brown-rot, scab, and other peach diseases.

*Location.*—Eastern United States, particularly Bentonville, Ark., and Fort Valley, Ga.

*Date begun.*—1901.

*Results.*—Invention of the self-boiled lime-sulphur mixture, the first practical fungicide for the peach.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Russetting of Apples by Bordeaux Mixture:**

*Object.*—To determine best fungicides and manner for controlling apple diseases without injuring the fruit.

*Location.*—Bentonville, Ark.

*Date begun.*—1903.

*Results.*—Abandonment of Bordeaux mixture for early spraying and substitution of lime-sulphur.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$100 (general expenses).

**Apple Leaf Diseases:**

*Object.*—To determine cause and remedy for various spots of apple foliage.

*Location.*—Laboratory at Washington, and Bentonville, Ark.

*Date begun.*—1909.

*Results.*—Proper working out and differentiation of several leaf diseases; paper entitled "Experiments with apple leaf-spot fungi," Journal of Agricultural Research, volume 2.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Apple-Blotch Investigations:**

*Object.*—To determine cause and remedy.

*Location.*—Bentonville, Ark, and other points in Missouri, Kansas, and Texas.

*Date begun.*—1906.

*Results.*—Life history of fungus worked out; control by spraying combined with cutting out the cankers; published in Bureau of Plant Industry Bulletin 144.

*Assignment.*—John W. Roberts, Leslie Pierce.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Total, Spraying Demonstrations and Experiments, \$5,800 (general expenses).**

**FRUIT ROTS AND SPOTS.****Fruit-Spot of Jonathan and of Grimes and Other Yellow Apples:**

*Object.*—To determine cause and methods of prevention. Particular study will be made of apples after they are picked, and when in transit, in storage, or on the market.

*Location.*—Washington, D. C., and various points in the United States.

*Date begun.*—1912.

*Results.*—Fifty species of rot fungi isolated; mycological work well started.

*Assignment.*—Charles Brooks, D. F. Fisher.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Apple Bitter-Pit:**

*Object.*—To determine cause and remedy; especially to study the effect of nutrition, water supply, and cultural methods.

*Location.*—Wenatchee, Wash.; Red Hook, N. Y.; Moorestown, N. J.

*Date begun.*—1909.

*Results.*—Preliminary data accumulated on the nature of this disease; fertilizer, irrigation, and culture tests started.

*Assignment.*—Charles Brooks, D. F. Fisher.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Fruit-Rot Investigations:**

*Object.*—To determine cause and remedy for rots of deciduous orchard fruits; especially to study these rots on fruits after picking and when in transit or storage or on the market.

*Location.*—Laboratory experiments at Washington, D. C.; inoculation tests at Arlington, Va., and Wenatchee, Wash.; storage work in various cities.

*Date begun.*—1888 to 1890.

*Results.*—Some 50 species of fungi have been isolated and are now growing in pure culture; external descriptions of the rots of pomaceous fruits prepared.

*Assignment.*—Charles Brooks, D. F. Fisher.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Apple Stigmonose:**

*Object.*—To study the disease and pathological changes in the tissues induced in apples and other related fruits by the punctures of insects in connection with bitter-pit investigations, which this disease very much resembles.

*Cooperation.*—Bureau of Entomology.

*Location.*—Washington, D. C.; Wenatchee, Wash.; points in New Jersey, New York, and other States.

*Date begun.*—July, 1914.

*Assignment.*—Charles Brooks, D. F. Fisher.

*Proposed expenditures, 1914-15.*—\$300 (general expenses).

**Total, Fruit Rots and Spots, \$7,800 (general expenses).**

**CITRUS AND SUBTROPICAL FRUIT-DISEASE INVESTIGATIONS.****Citrus and Subtropical Fruit-Disease Investigations:**

*Object.*—To find causes and remedies.

*Cooperation.*—Growers.

*Location.*—Temporary field laboratory, Plymouth, Fla.

*Date begun.*—Under old Division of Pathology, in 1892; later in subtropical laboratory, Miami, Fla.; transferred to Fruit-Disease Investigations in 1908; present work actually inaugurated in 1912.

*Results.*—Preliminary study of citrus diseases; experiments now under way.

*Assignment.*—J. G. Grossenbacher.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**GRAPE AND SMALL-FRUIT DISEASES.****Grape Diseases:**

*Object.*—To determine cause, discover or improve control methods, and study life histories and habits of causative organisms.

*Cooperation.*—New Jersey Experiment Station.

*Location.*—Washington, D. C., Arlington, Va., and Vineland, N. J.

*Date begun.*—1905.

*Results.*—Much additional knowledge of the organisms, their distribution, and control.

*Assignment.*—C. L. Shear, R. B. Wilcox.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Cranberry Diseases:**

*Object.*—To investigate cause, improve control and preventive methods, and study habits and life histories of causative organisms.

*Cooperation.*—Massachusetts Experiment Station.

*Location.*—Washington, D. C., Arlington, Va., Massachusetts, and New Jersey.

*Date begun.*—1901.

*Results.*—Additional knowledge of the parasite, distribution and methods of control; three new diseases discovered and studied.

*Assignment.*—C. L. Shear, A. M. Beckwith.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Miscellaneous Small-Fruit Diseases:**

*Object.*—To study fungous and physiological diseases of raspberries, blackberries, currants, gooseberries, and strawberries, and methods of prevention and control.

*Cooperation.*—Small-fruit growers.

*Location.*—Washington, D. C.; Arlington, Va.; and Vineland, N. J.

*Date begun.*—1906.

*Results.*—Increased knowledge of the life histories of the parasites, their importance, distribution, and control.

*Assignment.*—C. L. Shear, R. B. Wilcox.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Investigation of Anthracnose:**

*Object.*—To determine life histories of the parasitic fungi of the genus *Glomerella*, their relation to various hosts, and methods of prevention and control.

*Cooperation.*—Growers and investigators.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Life histories of the forms from 36 hosts determined.

*Assignment.*—C. L. Shear and assistants.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Total, Grape and Small Fruit Diseases, \$11,500 (general expenses).**

## PHYSIOLOGICAL FRUIT DISEASES.

**Nutrition in Relation to Fruit Diseases:**

*Object.*—To determine relation of fertilizer ingredients to orchard diseases; to determine the effect of soil constituents on disease.

*Cooperation.*—Fruit growers.

*Location.*—Washington, D. C.; field work, mainly in orchards of the West.

*Date begun.*—1891.

*Results.*—Diseased specimens collected and identified and diseases described; field identifications in the orchards.

*Assignment.*—W. S. Ballard.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Chlorotic Diseases of Fruit Trees:**

*Object.*—To distinguish the principal types and determine cause and remedy.

*Cooperation.*—Fruit growers.

*Location.*—States west of 100th meridian; laboratory work at Washington, D. C.

*Date begun.*—1907.

*Results.*—Data accumulated as to nature and distribution of diseases.

*Assignment.*—W. S. Ballard.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Total, Physiological Fruit Diseases, \$5,500 (general expenses).**

**Total, Fruit-Disease Investigations, \$56,375 (general expenses, \$52,675; statutory, \$3,700).**

## INVESTIGATIONS IN FOREST PATHOLOGY.

## OFFICE AND LABORATORY.

**Office and Laboratory:**

*Object.*—To care for office and laboratory routine.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—Haven Metcalf, T. C. Taylor.

*Proposed expenditures, 1914-15.*—\$360 (general expenses, \$120; statutory, \$240).

## DISEASES OF ORNAMENTAL AND SHADE TREES AND SHRUBS.

**Miscellaneous Diseases of Shade and Ornamental Trees and Shrubs:**

*Object.*—Investigation and control of these diseases.

*Location.*—Washington, D. C.; Providence, R. I.

*Date begun.*—1907.

*Results.*—Information disseminated regarding these diseases and their control; improvements and standardization of methods in tree surgery.

*Assignment.*—J. F. Collins.

*Proposed expenditures, 1914-15.*—\$1,675 (general expenses, \$1,550; statutory, \$125).

**Survey of Diseases of Shade and Ornamental Trees:**

*Object.*—To record the distribution, extent, and annual occurrence of diseases of shade and ornamental trees and shrubs in the United States.

*Location.*—Washington, D. C.; Providence, R. I.

*Date begun.*—1907.

*Results.*—Detection of several newly imported and potentially dangerous diseases.

*Assignment.*—Haven Metcalf, J. F. Collins.

*Proposed expenditures, 1914-15.*—\$1,899 (general expenses, \$1,799; statutory, \$100).

**Total, Diseases of Ornamental and Shade Trees and Shrubs, \$3,574 (general expenses, \$3,349; statutory, \$225).**

## PATHOLOGICAL PROBLEMS IN WOOD PRESERVATION.

**Decay of Mining Timbers:**

*Object.*—To secure information as to exact cause of decay in mining timbers, with a view to improving methods of preservation.

*Cooperation.*—Forest Products Laboratory, Forest Service.

*Location.*—Madison, Wis.

*Date begun.*—1909.

*Results.*—Definite knowledge of the causes of decay of mining timbers.

*Probable date of completion.*—July 1, 1915.

*Assignment.*—C. J. Humphrey.

*Proposed expenditures, 1914-15.*—\$175 (general expenses, \$150; statutory, \$25).

**Pathological Problems of Deterioration of Fire-Killed Timber:**

*Object.*—To determine the relation of fungi and associated conditions to deterioration of fire-killed timber.

*Cooperation.*—Forest Service.

*Location.*—National Forest District, No. 1.

*Date begun.*—1912.

*Results.*—Definite knowledge of deterioration of factors.

*Probable date of completion.*—July 1, 1916.

*Assignment.*—Jas. R. Weir.

*Proposed expenditures, 1914-15.*—\$1,195 (general expenses, \$1,100; statutory, \$95).

**Miscellaneous Pathological Problems of Wood Preservation:**

*Object.*—To work out miscellaneous problems on the mycological aspects of wood preservation.

*Cooperation.*—Forest Products Laboratory, Forest Service.

*Location.*—Madison, Wis.

*Date begun.*—1909.

*Results.*—Definite knowledge regarding the causes of various wood rots, and the action of various preservatives; practical results reflected in the wood preservation work of the Forest Products Laboratory.

*Assignment.*—C. J. Humphrey.

*Proposed expenditures, 1914-15.*—\$3,870 (general expenses, \$3,750; statutory, \$120).

**Total, Pathological Problems in Wood Preservation, \$5,240** (general expenses, \$5,000; statutory, \$240).

**FOREST-TREE DISEASES.****Effects of Sulphur and Other Gases on Forest Trees:**

*Object.*—To study effects and conditions with reference to control or abatement.

*Location.*—Anaconda, Mont., and elsewhere.

*Date begun.*—1904.

*Results.*—Information, especially in regard to degree and distance of damage, relative resistance of trees, etc., has been collected and is available for correspondents, expert testimony, etc.

*Probable date of completion.*—July 1, 1915.

*Assignment.*—Geo. G. Hedgcock.

*Proposed expenditures, 1914-15.*—\$2,150 (general expenses, \$2,000; statutory, \$150).

**Diseases of Forest Nursery Stock:**

*Object.*—Control of these diseases.

*Cooperation.*—Forest Service and private nurserymen.

*Location.*—Halsey, Nebr.; Garden City, Kans.; and various other national and private forest nurseries.

*Date begun.*—1910.

*Results.*—Effective commercial control of these diseases in the localities studied.

*Assignment.*—Carl Hartley.

*Proposed expenditures, 1914-15.*—\$5,890 (general expenses, \$5,640; statutory, \$250).

**Preliminary Disease Survey of the National and Other Forests:**

*Object.*—To furnish fundamental data on present condition of forests of United States with respect to disease.

*Cooperation.*—Forest Service.

*Location.*—Washington, D. C., Madison, Wis., Missoula, Mont., Denver, Colo., Albuquerque, N. Mex., and San Francisco, Cal.

*Date begun.*—1907.

*Results.*—Substantial contributions to knowledge regarding range and seriousness of forest diseases.

*Probable date of completion.*—January 1, 1918.

*Assignment.*—Geo. G. Hedgcock.

*Proposed expenditures, 1914-15.*—\$1,525 (general expenses, \$1,500; statutory, \$25.)

**Cooperative Field Studies and Demonstrations in Forest Pathology:**

*Object.*—Controlling these diseases, particularly in the national forests.

*Cooperation.*—Forest Service.

*Location.*—Missoula, Mont., Denver, Colo., Albuquerque, N. Mex., and San Francisco, Cal.

*Date begun.*—1913.

**Cooperative Field Studies and Demonstrations in Forest Pathology—Contd.**

*Results.*—Enforcement of "sanitary clause" in timber-sale contracts; development of improved methods of marking and scaling with reference to forest hygiene.

*Assignment.*—Geo. G. Hedgcock, E. P. Meinecke, Jas. R. Weir, W. H. Long.

*Proposed expenditures, 1914-15.*—\$10,186 (general expenses, \$9,901; statutory, \$285).

**Miscellaneous Forest-Tree Diseases:**

*Object.*—Investigation and control of new or special diseases not included in other projects.

*Cooperation.*—Forest Service.

*Location.*—Washington, D. C., Providence, R. I., Madison, Wis., Missoula, Mont., Denver, Colo., Albuquerque, N. Mex., and San Francisco, Cal.

*Date begun.*—1913.

*Results.*—Fundamental contributions to knowledge of 22 tree diseases.

*Assignment.*—Haven Metcalf, Geo. G. Hedgcock.

*Proposed expenditures, 1914-15.*—\$2,150 (general expenses, \$2,000; statutory, \$150).

**Total, Forest-Tree Diseases, \$21,901 (general expenses, \$21,041; statutory, \$860).**

**IMPORTED AND EPIDEMIC TREE DISEASES.****Miscellaneous Imported and Epidemic Tree Diseases:**

*Object.*—Control of these diseases.

*Cooperation.*—Federal Horticultural Board.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—Haven Metcalf, Perley Spaulding, N. E. Stevens.

*Proposed expenditures, 1914-15.*—\$10,135 (general expenses, \$10,000; statutory, \$135).

**White-Pine Blister Rust:**

*Object.*—Control of the disease.

*Cooperation.*—Federal Horticultural Board; informal cooperation with State foresters, firms, and individuals.

*Location.*—Washington, D. C., and various points in Vermont, New Hampshire, New York, Pennsylvania, New Jersey, and other States.

*Date begun.*—1909.

*Results.*—Prevention of importation of 5-leaf pines; the destruction and apparent elimination of the disease wherever found, and fundamental contributions to knowledge of the disease.

*Assignment.*—Perley Spaulding.

*Proposed expenditures, 1914-15.*—\$10,100 (general expenses, \$10,000; statutory, \$100).

**Chestnut Bark Disease:**

*Object.*—To control the chestnut tree bark disease.

*Cooperation.*—Ohio, West Virginia, Virginia, and North Carolina Experiment Stations.

*Location.*—Washington, D. C., Providence, R. I., and numerous points in Ohio, West Virginia, Virginia, and North Carolina.

*Date begun.*—1907.

*Results.*—Discovery of the real nature and origin of the disease—a parasitic fungus disease, not indigenous, but imported from eastern Asia in nursery stock; manner of distribution and methods of control determined; utilization of disease-killed trees made possible; discovery of Asiatic resistant varieties; dissemination of information by demonstrations, publications, and correspondence.

*Assignment.*—R. Kent Beattie, N. E. Stevens.

*Proposed expenditures, 1914-15.*—\$20,600 (general expenses, \$20,000; statutory, \$600).

**Total, Imported and Epidemic Tree Diseases, \$40,835 (general expenses, \$40,000; statutory, \$835).**

**Total, Investigations in Forest Pathology, \$71,910 (general expenses, \$69,510; statutory, \$2,400).**

## COTTON AND TRUCK DISEASE INVESTIGATIONS.

## OFFICE AND LABORATORY.

**Office and Laboratory:**

*Object.*—To provide for administrative, clerical, and routine laboratory work necessary for the proper conduct of the research projects.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—W. A. Orton, H. A. Edson.

*Proposed expenditures, 1914-15.*—\$8,775 (general expenses, \$3,770; statutory, \$5,005).

## COTTON DISEASES.

**Breeding for Wilt Resistance in Cotton under Boll-Weevil Conditions:**

*Object.*—To breed improved big-bollled varieties of wilt-resistant cotton early enough for use under boll-weevil conditions.

*Location.*—Florence, S. C.; Brundidge and Selma, Ala.

*Date begun.*—1908.

*Results.*—Three selections from hybrids made in 1908 between the wilt-resistant "Dixie" and nonresistant but otherwise superior cottons grown since 1910 on wilt-infected land show improvement over "Dixie" in most commercial characters combined with wilt resistance. These are being grown at two points in Alabama to test resistance to wilt and boll weevil; seed being increased in South Carolina; other hybrids being bred to meet the demand for wilt-resistant long-staple cotton; several promising strains selected.

*Assignment.*—W. W. Gilbert, W. A. Orton, L. O. Watson, A. C. Lewis.

*Proposed expenditures, 1914-15.*—\$2,350 (general expenses).

**Cooperative Wilt-Resistant Cotton and Cowpea Breeding:**

*Object.*—To instruct farmers in methods of breeding wilt-resistant cotton and cowpeas, stimulate production of resistant seed, and demonstrate methods for control of root-knot.

*Cooperation.*—South Carolina and Alabama Experiment Stations, and Georgia State Board of Entomology.

*Location.*—South Carolina, Georgia, and Alabama.

*Date begun.*—1911. (Experiments in breeding for wilt resistance begun in 1901.)

*Results.*—Work thoroughly organized in South Carolina and Georgia; 40 farmers breeding wilt-resistant cotton under department's supervision; over 3,000 bushels of seed grown for sale in 1913; field agents attend farmer's institutes and other agricultural gatherings and lecture on work; results published in Document 648 and B. P. I. Cir. 92 and Farmers' Bulletin in press.

*Assignment.*—W. W. Gilbert, H. W. Barre, L. O. Watson, A. C. Lewis, C. A. McLendon.

*Proposed expenditures, 1914-15.*—\$4,550 (general expenses).

**Miscellaneous Cotton Diseases:**

*Object.*—To study the various diseases of cotton, discover preventive or remedial treatment, and breed resistant varieties.

*Location.*—Southern States.

*Date begun.*—1898.

*Results.*—Minor field and laboratory studies and experiments made on cotton wilt and boll shedding, a stem disease in Arizona, and various other diseases. Data in B. P. I. Bul. 105, part 2, and Cir. 9.

*Assignment.*—W. A. Orton, W. W. Gilbert, L. O. Watson.

*Proposed expenditures, 1914-15.*—\$150 (general expenses).

**Total, Cotton Diseases, \$7,050 (general expenses).**

## TRUCK-CROP DISEASES.

**Potato Diseases:**

*Object.*—To discover causes and methods of prevention or control of potato diseases in the United States.

*Cooperation.*—Colorado Experiment Station; informally with other State stations and with farmers.

*Location.*—Washington, D. C.; Caribou, Me.; Jerome, Idaho.; Greeley, Colo.; Norfolk, Va., and other points.

*Date begun.*—1908.

**Potato Diseases—Continued.**

*Results.*—Life history of late-blight fungus cleared up, including method of overwintering; wilt, leaf-roll, curly-dwarf, and mosaic studied and causes or probable nature determined; the several causes of tuber rots differentiated; foreign parasites, namely, silver scurf, powdery scab, and wart described; several publications written on above diseases and their control.

*Assignment.*—W. A. Orton, H. W. Wollenweber, I. E. Melhus, H. A. Edson.

*Proposed expenditures, 1914-15.*—\$14,090 (general expenses, \$13,250; statutory, \$840).

**Potato Seed Inspection and Certification:**

*Object.*—To provide a means for improving the quality of potato stock, particularly that entering into interstate trade, with reference to freedom from disease, trueness to type, and freedom from varietal mixture.

*Cooperation.*—Informal, with experiment stations in Wisconsin and Michigan and with Maine State Department of Agriculture and Virginia Truck Experiment Station.

*Location.*—Washington, D. C., and all principal potato States.

*Date begun.*—1914.

*Results.*—Great interest awakened in many places and an actual start made in Wisconsin, Maine, and Michigan.

*Assignment.*—W. A. Orton, Wm. Stuart.

*Proposed expenditures, 1914-15.*—\$1,600 (general expenses).

**Sweet-Potato Diseases:**

*Object.*—To study the several sweet-potato diseases and discover means of control.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Washington, D. C.; Vineland, N. J., and Norfolk and Tasley, Va.

*Date begun.*—1911.

*Results.*—Dry-rot, foot-rot, and stem-rot diseases of sweet potato investigated; results of dry-rot and foot-rot investigations published and those on stem-rot in process of publication. It has been ascertained that dry-rot does its greatest damage in storage houses; successful control measures for stem-rot and black-rot worked out; investigations of the resistance of different varieties of sweet potatoes to stem-rot nearly completed.

*Probable date of completion.*—1916.

*Assignment.*—L. L. Harter, Ethel C. Field.

*Proposed expenditures, 1914-15.*—\$3,725 (general expenses).

**Malnutrition of Truck Crops:**

*Object.*—To study physiological effect of excessive application of commercial fertilizers on truck crops and find best means of restoring soils to normal condition.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Washington, D. C., and Norfolk, Va.

*Date begun.*—1906.

*Results.*—The malnutrition studies have been confined to cabbage and spinach.

Investigations show that this trouble can be largely controlled by crop rotation and a rational system of fertilizing, the proper use of lime, stable manure, and green-manure crops.

*Assignment.*—L. L. Harter.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Breeding Rust-Resistant Asparagus:**

*Object.*—To secure improved strains of asparagus immune to rust.

*Cooperation.*—Massachusetts Experiment Station and the Massachusetts Asparagus Growers' Association.

*Location.*—Washington, D. C., and Concord, Mass.

*Date begun.*—1906.

*Results.*—A new method of breeding asparagus resistant to rust and of improved quality has been discovered and resistant strains of much promise originated.

It is proposed to continue testing and propagation of the resistant races, their trial in other localities, and eventual distribution.

*Assignment.*—J. B. Norton.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Miscellaneous Truck-Crop Diseases:**

*Object.*—To determine the causes of truck-crop diseases and find methods for suppression and control.

*Location.*—Washington, D. C., and various other points.

*Date begun.*—1901.

**Miscellaneous Truck-Crop Diseases—Continued.**

*Results.*—Identification of many diseases, and replies to correspondence; studies on several new troubles, one a tomato fruit rot, nearly completed.

*Assignment.*—W. A. Orton, L. L. Harter, W. W. Gilbert, Clara O. Jamieson, Ethel C. Field, H. W. Wollenweber, I. E. Melhus, J. B. Norton, C. W. Carpenter, F. J. Pritchard, L. F. Longley.

*Proposed expenditures, 1914-15.*—\$3,925 (general expenses).

**Truck-Crop Spraying:**

*Object.*—To determine best spraying methods and apparatus for control of truck-crop diseases.

*Location.*—Work at present limited to Maryland.

*Date begun.*—1911.

*Results.*—Successful control of leaf diseases of cucumbers, muskmelons, celery, and potatoes effected by spraying.

*Assignment.*—W. A. Orton.

*Proposed expenditures, 1914-15.*—The expense of this work is defrayed by the Maryland Experiment Station.

**Ginseng Diseases:**

*Object.*—To study diseases of ginseng and methods of control.

*Cooperation.*—New York (Cornell), Michigan, Wisconsin, and Ohio experiment stations.

*Location.*—New York, Pennsylvania, Michigan, Wisconsin, and Ohio.

*Date begun.*—1911.

*Results.*—Cause and control measures determined for *Alternaria* leaf-blight, dry-rot, rust, white-rot, wilt, root-knot, and other ginseng diseases; methods of soil sterilization tested; life histories of parasitic fungi and bacteria well studied; growers informed by publications, letters, and personal visits.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—Joseph Rosenbaum, J. A. McClintock, J. W. Brand.

*Proposed expenditures, 1914-15.*—\$2,500 (Pathological Laboratory).

**Nematode Diseases of Truck Crops:**

*Object.*—The investigation of diseases of truck crops and related plants caused by parasitic nematodes and the discovery and application of remedial measures.

*Location.*—Washington, D. C.; South Carolina, and other points to be selected later.

*Date begun.*—July 1, 1914.

*Assignment.*—L. P. Byars.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Monograph of Fusarium:**

*Object.*—To work out the life history of parasitic species of *Fusarium* and determine relationship to plant disease.

*Location.*—Washington, D. C.; Berlin and other points in Europe.

*Date begun.*—1911.

*Results.*—Differentiation of 100 species and varieties into 10 sections and 6 subsections; perfection of method of study, enabling species to be determined by morphological character; wilt-producing parasites fall into one group; relation of other species to potato dry-rot, etc., determined in manner of fundamental value to pathology.

*Probable date of completion.*—1915.

*Assignment.*—H. W. Wollenweber, C. W. Carpenter.

*Proposed expenditures, 1914-15.*—\$4,000 (general expenses).

**Total, Truck-Crop Diseases,** \$36,640 (general expenses, \$35,800; statutory, \$840).

**FORAGE-CROP DISEASES.****Cowpea Diseases:**

*Object.*—To study various diseases of cowpeas and methods of control, including the breeding of resistant varieties.

*Location.*—Washington, D. C.; Monetta, S. C., and other southern points.

*Date begun.*—1900.

*Results.*—Many diseases of cowpeas studied; causes and control measures indicated; discovery of disease-resistant variety, "Iron"; production of new hybrids.

*Probable date of completion.*—1914.

*Assignment.*—W. W. Gilbert.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Alfalfa Diseases:**

*Object.*—To discover causes of various alfalfa diseases and methods of control.

*Location.*—Washington, D. C.; observation on field trips in connection with other work.

*Date begun.*—1905.

*Results.*—Laboratory studies on material received.

*Assignment.*—L. L. Harter, Clara O. Jamieson.

*Proposed expenditures, 1914-15.*—\$780 (general expenses).

**Miscellaneous Forage-Crop Diseases:**

*Object.*—To determine causes of diseases of forage crops other than cowpea and alfalfa and find methods for suppression and control.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Laboratory studies on material received; field observations.

*Assignment.*—L. L. Harter, Clara O. Jamieson, F. J. Pritchard, L. E. Longley.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Total, Forage-Crop Diseases,** \$36,540 (general expenses, \$35,700; statutory, \$840.)

**Total, Cotton and Truck Disease Investigations,** \$54,345 (general expenses, cotton and truck diseases, \$45,000; pathological laboratory, \$2,500; statutory, \$5,845).

**CROP PHYSIOLOGY AND BREEDING INVESTIGATIONS.****Office and Laboratory:**

*Object.*—This project covers the general office work necessary in the handling of the experiments under the scientific projects.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Assignment.*—W. T. Swingle, J. A. Ferrall.

*Proposed expenditures, 1914-15.*—\$4,830 (general expenses, \$900; statutory, \$3,930).

**Testing Farms on Indian Reservations:**

*Object.*—To test crops promising for culture by the Indians; to train Indians in the methods of handling crops that are likely to be grown by white settlers on adjoining land.

*Cooperation.*—Office of Indian Affairs, Department of the Interior.

*Location.*—Sacaton, Ariz., Palm Springs, Cal., and Shiprock, N. Mex.

*Date begun.*—1906.

*Results.*—Two new industries have been established among the Indians as a result of this work—the culture of Egyptian cotton and the growing of choice, disease-free Bermuda onions. As a result of the experiments on the reservation at Sacaton, 500 acres of Egyptian cotton were planted by settlers in the Salt River Valley in 1912, with such promising results that the area was increased to 4,000 acres in 1913.

*Assignment.*—W. T. Swingle, E. W. Hudson.

*Proposed expenditures, 1914-15.*—\$11,025 (general expenses, \$9,665; statutory, \$1,360).

**Date Breeding and Culture:**

*Object.*—To establish date culture on a commercial scale in the United States.

This work will include experiments to develop methods for the rapid propagation of rare and valuable varieties and investigations in artificial ripening.

*Cooperation.*—University of California at Mecca; University of Arizona at Tempe, and Phoenix.

*Location.*—Mecca, Indio, and El Centro, Cal.; Tempe and Phoenix, Ariz.; Laredo, Tex.

*Date begun.*—1898.

*Results.*—At the beginning of this work, the date palm was merely a curiosity in this country. Now date culture is considered one of the great prospective fruit industries of the Southwest, representing at present an investment of more than \$250,000. During 1913 nearly 20,000 offshoots were imported from the Old World by private growers, and hundreds of settlers have planted out date orchards in the Coachella and Imperial Valleys of California.

*Assignment.*—W. T. Swingle, S. C. Mason, Bruce Drummond.

*Proposed expenditures, 1914-15.*—\$14,777 (general expenses, \$14,182; statutory, \$595).

**Caprification of the Fig and Breeding New Varieties of Figs and Caprifigs:**

*Object.*—To discover economical and practical methods for the caprification of Smyrna figs in order to establish their culture on a commercial scale in this country; to study methods for storing caprifigs during winter, curing of figs, and the possibility of caprifying figs other than Smyrna type.

*Cooperation.*—Private growers only.

*Location.*—Loomis and other points in California.

*Date begun.*—1898.

*Results.*—Prior to the introduction of the fig insect (*Blastophaga*) in this country, Smyrna fig culture had been a failure here. The first year after the insect's introduction a quantity of Smyrna figs was produced and now the annual production of dried figs in California exceeds 3,500 tons and is constantly increasing. Through the encouragement given fig growers by the Department of Agriculture and its help in distributing caprifigs and choice seedling varieties of Smyrna figs, more than 12,000 acres additional have been planted to figs in California during the past two years.

*Assignment.*—W. T. Swingle, G. P. Rixford.

*Proposed expenditures, 1914-15.*—\$4,966 (general expenses, \$4,891; statutory, \$75).

**Breeding of Citrus Fruits:**

*Object.*—To develop by hybridization and breeding new and hardy types of citrus fruits.

*Cooperation.*—State experiment stations and private growers in States mentioned under "Location."

*Location.*—Special citrus testing stations at Glen St. Mary, Eustis, Little River, and Miami, Fla.; Chico and Riverside, Cal.; Tuscaloosa, Ala.; Eatonton and Madison, Ga.; general experiments with State experiment stations and private growers in Alabama, Arizona, Arkansas, California, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Oregon, Tennessee, Texas, and Washington.

*Date begun.*—1897.

*Results.*—Already the citrange, a new and hardy substitute for the lemon, and the tangelo, a new and sprightly orange, have been originated. The former is meeting with much favor as a home fruit in regions just outside the limits of ordinary citrus culture, while the latter is being planted to some extent in commercial orchards in Florida. Thousands of new hybrids have been made and are being tested in cooperation with State experiment stations and private growers.

*Assignment.*—W. T. Swingle, Maude Kellerman, E. M. Savage.

*Proposed Expenditures, 1914-15.*—\$13,559 (general expenses, \$10,299; statutory, \$3,260).

**Dry-Land Arboriculture:**

*Object.*—To find deep-rooted and drought-resistant tree crops better adapted for culture in dry-land regions of the United States than the shallow-rooted annual crops now grown.

*Cooperation.*—Chiefly with private growers, though some experiments are conducted at department field stations.

*Location.*—Sacaton and Yuma, Ariz.; Indio, Neenach, and Banning, Cal.; Lampasas and San Antonio, Tex.; Fallon and Pyramid Lake, Nev.

*Date begun.*—1906.

*Results.*—A number of native species of *Prunus* have been discovered that seem likely to prove of great value for breeding purposes and for use as stocks for our domesticated stone fruits in dry regions. One of these species, the "wild peach" of Texas, promises to be of considerable value in its present form, as it yields small peachlike fruits of excellent quality. Efforts are being made to introduce the carob into commercial culture and to extend the area devoted to dry-land olive culture in the United States.

*Assignment.*—S. C. Mason.

*Proposed expenditures, 1914-15.*—\$2,740 (general expenses, \$2,425; statutory, \$315).

**Miscellaneous:****(a) ESTABLISHMENT OF PISTACHE CULTURE—**

*Object.*—To introduce the pistache nut into commercial culture in this country; to study the life history of the pistache and its wild relatives.

*Cooperation.*—Private growers throughout the Southwest.

*Location.*—Arizona, California, New Mexico, Texas, and to a limited extent in Nevada and Utah.

**Miscellaneous—Continued.****(a) ESTABLISHMENT OF PISTACHE CULTURE—Continued.**

*Date begun.*—Preliminary, 1899; active, 1904.

*Results.*—Thousands of stocks have been distributed to growers in the States mentioned and these stocks will be budded over as rapidly as possible to scions of the best imported commercial pistaches. The pistache is the highest-priced nut reaching our markets, and the introduction of its culture on a commercial scale will enable us to replace the nuts now imported, and to a large extent the importation of almonds also, since the pistache is preferred to the former wherever both are grown.

*Assignment.*—W. T. Swingle, Maude Kellerman.

*Proposed expenditures, 1914-15.*—\$2,065 (general expenses, \$2,000; statutory, \$65).

**(b) INVESTIGATIONS ON STIMULATION TREATMENT OF PLANTS AND SEEDS:**

*Object.*—To investigate the cause of increased yields in plants sprayed with Bordeaux mixture or other substances, and the practical application of such treatments to agriculture.

*Cooperation.*—Private growers.

*Location.*—Florida, California, Virginia, and West Virginia.

*Date begun.*—Preliminary, 1898; active, 1904.

*Results.*—A new method of making Bordeaux mixture was discovered early in the investigations on stimulation treatments and is now used in every civilized country.

*Assignment.*—W. T. Swingle.

*Proposed expenditures, 1914-15.*—\$75 (general expenses).

**(c) IMPROVEMENT IN HIGH-POWER MICROSCOPES:**

*Object.*—To modify and improve high-power microscopes to better adapt them to the needs of the investigator.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—New microscopic objectives have been originated, several improvements have been made in the mechanical stage and an improved method worked out for the utilization of the naphthobrom immersion objective.

*Assignment.*—W. T. Swingle.

*Proposed expenditures, 1914-15.*—\$75 (general expenses).

**(d) BREEDING NEW TYPES OF PINEAPPLES:**

*Object.*—To secure, by breeding, varieties of pineapples superior to those now grown in this country.

*Cooperation.*—Private growers.

*Location.*—Florida and Porto Rico.

*Date begun.*—Preliminary, 1898; active, 1904.

*Results.*—A number of new pineapple varieties have been originated, a few of them superior to any now cultivated.

*Assignment.*—W. T. Swingle.

*Proposed expenditures, 1914-15.*—\$28 (general expenses).

*Total, miscellaneous, 1914-15.*—\$2,243 (general expenses, \$2,178; statutory, \$65).

**Total, Crop Physiology and Breeding Investigations, \$54,140** (general expenses, \$44,540; statutory, \$9,600).

**SOIL-BACTERIOLOGY INVESTIGATIONS.****OFFICE AND LABORATORY.****Office and Laboratory:**

*Object.*—To carry on administrative, clerical, and routine laboratory work necessary for the proper conduct of research projects.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—K. F. Kellerman.

*Proposed expenditures 1914-15.*—\$5,565 (general expenses, \$2,675; statutory, \$2,890).

**DISTRIBUTION AND STUDY OF LEGUME BACTERIA.****Demonstration of Inoculation of Legumes:**

*Object.*—To demonstrate the benefit of inoculation of legumes with nitrogen-fixing bacteria by carefully supervised field experiments.

*Cooperation.*—Selected farmers.

*Location.*—Pennsylvania, Ohio, and Georgia.

*Date begun.*—1901.

*Results.*—Information as to best methods of inoculating legumes; publication.

*Assignment.*—K. F. Kellerman, F. L. Goll, L. T. Leonard.

*Proposed expenditures, 1914-15.*—\$1,200 (general expenses).

**Distribution of Cultures for Inoculating Legumes:**

*Object.*—To distribute pure cultures of nitrogen-fixing bacteria for general field tests of inoculating legumes.

*Location.*—United States.

*Date begun.*—1901.

*Results.*—Increase in quality and quantity of leguminous crops.

*Assignment.*—K. F. Kellerman, L. T. Leonard.

*Proposed expenditures, 1914-15.*—\$4,190 (general expenses, \$1,300; statutory, \$2,890).

**Laboratory Investigations of Legume Bacteria:**

*Object.*—To investigate the physiology and life history of strains of *Bacillus radicola*.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Results.*—Improving methods of propagating and testing cultures.

*Assignment.*—K. F. Kellerman, L. T. Leonard.

*Proposed expenditures, 1914-15.*—\$1,400 (general expenses).

**Total, Distribution and Study of Legume Bacteria, \$6,790** (general expenses, \$3,900; statutory, \$2,890).

**INVESTIGATIONS IN SOIL BACTERIOLOGY.****Investigation of the Organisms Causing Decomposition of Organic Material in Soils:**

*Object.*—To determine the causes of the different kinds of decomposition of organic matter.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Primary causes of humus formation from carbonaceous material determined; published in B. P. I. Bul. 266 and Circ. 118, also in technical journals.

*Assignment.*—K. F. Kellerman, F. Lohnis, F. M. Scales, R. C. Wright, N. R. Smith.

*Proposed expenditures, 1914-15.*—\$7,500 (general expenses).

**Investigation of the Nitrifying, Denitrifying, and Nitrogen-Fixing Bacteria:**

*Object.*—To determine the relationships of the organisms which nitrify, denitrify, etc.

*Location.*—Washington, D. C.; Riverside, Cal.; and Fallon, Nev.

*Date begun.*—1912.

*Results.*—Certain relations of bacteria to fertility determined.

*Assignment.*—K. F. Kellerman, I. G. McBeth, R. C. Wright.

*Proposed expenditures, 1914-15.*—\$9,375 (general expenses).

**Study of Relation of Soil Bacteria to Growth of Crop Plants:**

*Object.*—To determine the effect upon plants of products of bacterial growth.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Legume bacteria ineffective upon cereals; data in B. P. I. Circ. 113.

*Assignment.*—K. F. Kellerman, L. T. Leonard.

*Proposed expenditures, 1914-15.*—\$600 (general expenses).

**Total, Investigations in Soil Bacteriology (proper), \$17,475** (general expenses).

**Total, Soil-Bacteriology Investigations, \$29,830** (general expenses, \$24,050; statutory, \$5,780).

**PLANT-NUTRITION INVESTIGATIONS.****Plant-Nutrition Investigations—General:**

*Object.*—To investigate some of the broad and fundamental problems relating to growth, development, and composition of plants as affected by nutrition, such as quantity of oil produced in important oil-bearing seeds, and shape, size, and structure of leaf of such plants as tobacco as influenced by factors of nutrition.

*Location.*—Washington, D. C., and Arlington, Va.

*Date begun.*—1901.

*Results.*—This work is particularly successful in determining the actual food requirements of tobacco plants and the special functions of the different plant food elements in increasing the value of crops. For example, experiments indicate that a more liberal use of potash on tobacco plants in the South would increase by a million dollars the value of the flue-cured crop.

*Assignment.*—W. W. Garner, H. A. Allard, Chas. W. Bacon.

*Proposed expenditures, 1914-15.*—\$9,850 (general expenses).

**Nutrition of the Date Palm:**

*Object.*—To determine the optimum conditions for nutrition and fruit production of the date palm, and to develop therefrom a rational system of employing fertilizers in the different date-growing regions.

*Location.*—Washington, D. C.; Indio and Mecca, Cal.; and Tempe, Ariz.

*Date begun.*—1912.

*Results.*—No results as yet available.

*Probable date of completion.*—1920.

*Assignment.*—W. W. Garner, H. A. Allard, K. F. Kellerman.

*Proposed expenditures, 1914-15.*—\$1,100 (general expenses).

**Total, Plant-Nutrition Investigations, \$10,950 (general expenses).**

## ACCLIMATIZATION AND ADAPTATION OF CROP PLANTS, AND COTTON BREEDING.

### OFFICE AND LABORATORY.

**Office and Laboratory:**

*Object.*—To provide for clerical and administrative routine, laboratory experiments, and other general details connected with field investigations.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$6,450 (general expenses, \$3,000; statutory, \$3,450).

### ACCLIMATIZATION, ADAPTATION, AND BREEDING OF COTTON.

**Acclimatization of Weevil-Resistant Varieties:**

*Object.*—To secure varieties of cotton resistant to the boll weevil and acclimatize them in the United States.

*Location.*—Mexico, Central America, and the cotton belt of the United States.

*Date begun.*—1905.

*Results.*—Kekchi cotton, of eastern Guatemala, has yielded selections whose particular characters indicate their adaptability to more northern districts of cotton belt in Texas and in western Tennessee.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$6,188 (general expenses).

**Cultural Factors under Weevil Conditions:**

*Object.*—To secure information concerning the local modifications of cultural methods necessitated by the presence of the boll weevil.

*Location.*—That part of the cotton belt infested by the boll weevil.

*Date begun.*—1905.

*Results.*—New cultural methods have been devised, which greatly increase the yield of cotton.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$4,950 (general expenses).

**Cultural Factors in Arid Regions:**

*Object.*—To study the relation of drought to weevil resistance.

*Location.*—Southwestern United States.

*Date begun.*—1906.

*Results.*—Importance of delayed planting under arid conditions demonstrated. "Durango" cotton has shown distinct advantages over other long-staple Upland varieties in drought resistance, as well as in adaptation to irrigated culture.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$1,237 (general expenses).

**Local Adjustment and Adaptation of Varieties:**

*Object.*—To ascertain the factors of local adjustment; determine the range of environmental adaptations of varieties, best varieties for particular local conditions; and to avoid present wasteful multiplicity of varieties by proper methods of standardization.

*Location.*—Cotton belt of the United States.

*Date begun.*—1909.

*Results.*—Extension of northern boundary of cotton belt by means of a new system of cotton culture and the local adjustment of superior varieties in new regions.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$2,475 (general expenses).

**Breeding and Preservation of Varieties:**

*Object.*—To determine general factors of improvement and deterioration of varieties, including selection, cultural methods, variety testing, etc.

*Location.*—Cotton belt of the United States.

*Date begun.*—1909.

*Results.*—Preservation of superior varieties of cotton and breeding of new varieties for future distribution.

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$9,900 (general expenses).

**Total, Acclimatization, Adaptation, and Breeding of Cotton, \$24,750 (general expenses).**

**ACCLIMATIZATION, ADAPTATION, AND EXTENSION OF CORN.****Acclimatization, Adaptation, and Extension of Corn:**

*Object.*—To secure varieties of corn adapted to conditions in our tropical territory and the United States, particularly in the subtropical Gulf region and the arid West.

*Location.*—Central and South America and Mexico.

*Date begun.*—1905.

*Results.*—Fertile hybrids between corn and teosinte have been produced; increase in size of seeds as result of crossing; discovery of variety adapted to deep planting.

*Assignment.*—G. N. Collins.

*Proposed expenditures, 1914-15.*—\$7,130 (general expenses, \$6,800; statutory, \$330).

**ACCLIMATIZATION AND ADAPTATION OF TROPICAL PLANTS.****Acclimatization and Adaptation of Tropical Plants:**

*Object.*—Acclimatization and adaptation of superior varieties of coffee, banana, cacao, rubber, coconut, and other palms, and other tropical plants in the United States, and the improvement of cultural and breeding methods as applied to such plants.

*Location.*—Washington, D. C.; the South and Southwestern States; and the tropical and subtropical possessions of the United States.

*Date begun.*—1909.

*Results.*—Progress made in the classification of cacao varieties; discovery of palms adapted to growing in the United States. (Most of this tropical work is carried on incidentally, as opportunity offers in connection with the acclimatization, adaptation, and breeding of cotton and corn.)

*Assignment.*—O. F. Cook.

*Proposed expenditures, 1914-15.*—\$3,450 (general expenses).

**Total, Acclimatization and Adaptation of Crop Plants, and Cotton Breeding, \$41,780 (general expenses, \$38,000; statutory, \$3,780).**

**DRUG-PLANT, POISONOUS-PLANT, PHYSIOLOGICAL, AND FERMENTATION INVESTIGATIONS.****OFFICE.****Office:**

*Object.*—To provide supervision, clerical assistants, and miscellaneous supervisory and administrative needs of the projects of this office.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—R. H. True and W. W. Stockberger.

*Proposed expenditures, 1914-15.*—\$8,882 (general expenses, \$3,382; statutory, \$5,500).

**DRUG AND RELATED PLANTS AND THEIR PRODUCTS.****Establishment of the Camphor Industry:**

*Object.*—Introduction of an industry in the culture and production of camphor in this country.

*Cooperation.*—Land and buildings furnished by Orange County (Fla.) Fair Association.

*Location.*—Orlando, Fla.

*Date begun.*—1908.

**Establishment of the Camphor Industry—Continued.**

*Results.*—1,000 acres now planted in camphor by private parties as a direct result of the department's experiments and another commercial planting of several thousand acres just being started. Laboratory studies of methods of handling, extracting, etc., have developed important improvements as compared with Asiatic methods.

*Probable date of completion.*—1918.

*Assignment.*—S. C. Hood.

*Proposed expenditures, 1914-15.*—\$4,170 (general expenses, \$3,450; statutory, \$720).

**Red-Pepper Cultivation for the Spice Market:**

*Object.*—Introduction of the culture of red peppers for spice market.

*Cooperation.*—Practical farmers.

*Location.*—Timmons ville, and southern part of South Carolina.

*Date begun.*—1906.

*Results.*—The successful introduction of paprika culture gives ground for believing that good profits may also be derived from the introduction of the hotter cayenne sorts of red pepper.

*Probable date of completion.*—1917.

*Assignment.*—Thos. B. Young.

*Proposed expenditure, 1914-15.*—\$2,160 (general expenses).

**Hop Improvement on the Pacific Coast and in New York:**

*Object.*—Improvement of methods of growing, curing, handling, and standardizing American hops. The work includes a physiological study of the root disease of hops, study of the influence of various fertilizers on yield and quality, development of hybrids with German varieties, and study of cost of production in relation to present method of handling the crop.

*Cooperation.*—Land and crop facilities furnished by hop growers.

*Location.*—Headquarters at Perkins, Cal.; also test of area under special handling in Oregon, and field investigations throughout the hop-growing regions of the Pacific Coast States and New York.

*Date begun.*—1905.

*Results.*—Improved methods of culture introduced; a large stock of hop seedlings of disease-resistant and other improved types being developed. Study of hop constituents and methods of judging hops has led to suggestion of rational criteria rather than value, removing discrimination against American hops.

*Assignment.*—W. W. Stockberger.

*Proposed expenditures, 1914-15.*—\$4,030 (general expenses).

**Tea Cultivation and Manufacture:**

*Object.*—Introduction of an industry in the cultivation and manufacture of American tea.

*Cooperation.*—Dr. Charles U. Shepard, furnishing land, crop, and factory.

*Location.*—Summerville, S. C.

*Date begun.*—1902.

*Results.*—American tea now produced and successfully marketed.

*Assignment.*—W. W. Stockberger.

*Proposed expenditures, 1914-15.*—\$1,020 (general expenses, 300; statutory, \$720).

**Vegetable Oil Crops and Their Products:**

*Object.*—To study American-grown plants yielding vegetable oils, with reference to their utilization in the manufacture of perfume, soaps, paints, varnish, and other products.

*Location.*—Washington, D. C.; crop facilities furnished by the testing gardens at Arlington, Va., Glenn Dale, Md., and Madison, Wis.

*Date begun.*—1906.

*Results.*—Discovery of new sources of thymol in species of *Monarda* (horsemint); of limonene, a turpentine substitute, in the common fireweed; of a substitute for linseed oil in raisin-seed waste; and demonstration of value in peach, apricot, and prune kernels, heretofore a large source of waste.

*Assignment.*—Frank Rabak.

*Proposed expenditures, 1914-15.*—\$2,440 (general expenses).

**Miscellaneous Field and Laboratory Work on Drug and Related Plants:**

*Object.*—To test in experimental field cultures numerous drug and related plants not covered by other projects, and to investigate their products in the laboratory with reference to their value and utilization. The project covers a large number of preliminary investigations and minor problems, including study of small experimental cultures of a large number of drug and related plants and miscellaneous pharmaceutical laboratory studies dealing with value and utilization of the products.

**Miscellaneous Field and Laboratory Work, etc.—Continued.**

*Cooperation.*—University of Wisconsin, at Madison, Wis.; R. S. Hepburn, Timmons ville, S. C.; Albert Dickinson, Orange City, Fla.

*Location.*—Arlington, Va.; Glenn Dale, Md.; Timmons ville, S. C.; Madison, Wis.; and Orange City, Fla.

*Date begun.*—1902.

*Assignment.*—W. Van Fleet, at Arlington and Glenn Dale; G. A. Russell, at Madison, Wis.; Thos. B. Young, South Carolina; S. C. Hood, Florida.

*Proposed expenditures, 1914-15.*—\$8,892 (general expenses, \$7,512; statutory, \$1,380).

**Total, Drug and Related Plants and Their Products, \$22,712** (general expenses, \$19,892; statutory, \$2,820.)

**POISONOUS-PLANT INVESTIGATIONS.****Field and Laboratory Studies of *Zygadenus* as Poisonous Plants:**

*Object.*—To ascertain the cause of poisonous properties of species of the genus *Zygadenus* (death camas) and to learn how best to treat animals that have been poisoned by these plants.

*Cooperation.*—Forest Service and Bureau of Animal Industry.

*Location.*—Headquarters at Greycliff, Mont.; field studies throughout the cattle-grazing States.

*Date begun.*—1912.

*Results.*—A camp has been organized in the vicinity of Greycliff where feeding experiments with *Zygadenus* species have been inaugurated under control conditions.

*Probable date of completion.*—1916.

*Assignment.*—C. Dwight Marsh.

*Proposed expenditures, 1914-15.*—\$3,630 (general expenses).

**Field and Laboratory Study of Larkspurs as Poisonous Plants:**

*Object.*—To ascertain relation of poisonous activities of larkspur to stage of growth, and to study the poisonous action of the plant and best method of treatment.

*Cooperation.*—Forest Service and Bureau of Animal Industry.

*Location.*—Greycliff, Mont., and field work throughout the grazing States.

*Date begun.*—1909.

*Results.*—Field work in Colorado reported in Farmers' Bulletin 531, and in a technical manuscript which has been submitted for publication.

*Probable date of completion.*—1916.

*Assignment.*—C. Dwight Marsh.

*Proposed expenditures, 1914-15.*—\$1,350 (general expenses).

**Field and Laboratory Study of Lupines as Poisonous Plants:**

*Object.*—To ascertain whether various species of lupines growing on grazing lands are poisonous to stock; if so, to develop methods of eliminating these losses.

*Cooperation.*—Forest Service and Bureau of Animal Industry.

*Location.*—Feeding experiments at Greycliff, Mont., and reconnaissance and field work throughout the grazing area.

*Date begun.*—1912.

*Results.*—Important findings regarding the effect of lupines on horses, cattle, and sheep have been accumulated during the past several seasons.

*Probable date of completion.*—1916.

*Assignment.*—C. Dwight Marsh.

*Proposed expenditures, 1914-15.*—\$2,730 (general expenses).

**Miscellaneous Studies of Poisonous Plants:**

*Object.*—To study and report on losses of stock from poisonous plants; and to help with suggestions as to methods of avoiding losses.

*Cooperation.*—Forest Service and Bureau of Animal Industry.

*Location.*—Greycliff, Mont., and elsewhere in the grazing States.

*Date begun.*—1904.

*Results.*—A large amount of reconnaissance work has been conducted, dangerous plants and dangerous areas pointed out, and methods of obviating losses shown.

*Assignment.*—C. Dwight Marsh.

*Proposed expenditures, 1914-15.*—\$1,350 (general expenses, \$870; statutory, \$480).

**Total, Poisonous-Plant Investigations, \$9,060** (general expenses, \$8,580; statutory, \$480).

## INVESTIGATIONS IN PLANT PHYSIOLOGY AND FERMENTATION.

**Physiological Action of Solutions of Organic and of Inorganic Substances on Crop Plants:**

*Object.*—To ascertain the fundamental requirements made by plants upon the medium in which they live.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Work yielding light on fundamentally important factors in plant physiology. A first report has been published in B. P. I. Bulletin 231.

*Assignment.*—R. H. True, H. H. Bartlett.

*Proposed expenditures, 1914-15.*—\$5,985 (general expenses).

**Physiological Study of the Effects of Storage on Fruits and Vegetables:**

*Object.*—To ascertain the physiological behavior of sweet potatoes, onions, and other vegetables, also fruits, during periods of storage under various conditions, with a view of determining the most favorable storage conditions.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—An elaborate study of the physiological changes taking place in the sweet potato before and during storage has been conducted and a first paper on the subject is now in manuscript form ready to be submitted for publication.

*Assignment.*—H. Hasselbring.

*Proposed expenditures, 1914-15.*—\$4,240 (general expenses).

**Physiological Study of the Relation of Oxidizing Enzymes to Plant Diseases:**

*Object.*—To devise a practical method of ascertaining variation in oxidase content in normal and diseased plants, and to investigate the relation of oxidase action to certain important plant diseases.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Report on biochemical study of the curly-top of sugar beets in B. P. I. Bul. 277; report on oxidase activity in health and "curly dwarf" potatoes submitted for publication.

*Probable date of completion.*—1917.

*Assignment.*—H. H. Bunzel.

*Proposed expenditures, 1914-15.*—\$3,540 (general expenses).

**Physiological Study of Molds and Parasitic Fungi and Their Relation to the Deterioration of Seeds, Fruits, Grains, and Other Plant Parts:**

*Object.*—To investigate the physiology of molds and parasitic fungi with special reference to the products of their metabolism, with a view of determining their conditions of life and the nature and effect of the products which they elaborate.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Methods of determining deterioration in maize published in B. P. I. Bul. 199; report on *Penicillium* published as B. P. I. Bul. 270.

*Probable date of completion.*—1917.

*Assignment.*—O. F. Black, Lon A. Hawkins.

*Proposed expenditures, 1914-15.*—\$6,040 (general expenses, \$5,140; statutory, \$900).

**Physiological Study of Germination:**

*Object.*—To investigate the fundamental physiology of germination of seeds, tubers, and other reproduction plant structures.

*Location.*—Washington, D. C.

*Date begun.*—July 1, 1914.

*Assignment.*—R. H. True.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Miscellaneous Investigations in Plant Physiology and Fermentation:**

*Object.*—To handle miscellaneous minor problems arising in the conduct of general plant physiological and fermentation investigations.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Miscellaneous minor investigations dealing with breeding, heredity, etc.; also fermentation, curing, etc.

*Assignment.*—R. H. True, H. H. Bartlett, S. L. Jodidi.

*Proposed expenditures, 1914-15.*—\$2,621 (general expenses).

**Total, Investigations in Plant Physiology and Fermentation,** \$24,426 (general expenses, \$23,526; statutory, \$900).

**Total, Drug-Plant, Poisonous-Plant, Physiological, and Fermentation Investigations,** \$65,080 (general expenses, \$55,380; statutory, \$9,700).

## AGRICULTURAL TECHNOLOGY AND COTTON STANDARDIZATION AND GRADING INVESTIGATIONS.

### OFFICE AND LABORATORY.

#### Office and Laboratory:

*Object.*—To conduct administrative work, including routine clerical and laboratory activities.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—N. A. Cobb, W. E. Chambers, Albert Mann.

*Proposed expenditures, 1914-15.*—\$5,740 (cotton standardization, \$3,200; statutory, \$2,540).

### AGRICULTURAL TECHNOLOGY INVESTIGATIONS.

#### Free-Living and Plant-Infesting Nematodes:

*Object.*—To improve the methods of treating crops so as to diminish the losses due to attacks of nematodes.

*Cooperation.*—Individual growers in various States.

*Location.*—California, Florida, Nevada, and other sections of the country, including practically every State; Washington, D. C.

*Date begun.*—1906.

*Results.*—Field and laboratory work resulting in discovery of many new forms; working out morphology and life history of new injurious parasite on citrus roots; publication of description of many new genera.

*Assignment.*—N. A. Cobb, W. E. Chambers.

*Proposed expenditures, 1914-15.*—\$4,780 (crop technology, \$3,060; statutory, \$1,720).

#### Agricultural Apparatus:

*Object.*—To investigate and improve agricultural apparatus, with a view to improved efficiency.

*Cooperation.*—Individual farmers and experts in various States.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Invention of a number of devices used in agricultural work, including bulb-trimming and bulb-scooping machine; study and work on a number of agricultural apparatuses, including a crimson-clover harvester, under way.

*Assignment.*—N. A. Cobb, W. E. Chambers, J. F. Barghausen.

*Proposed expenditures, 1914-15.*—\$1,020 (crop technology, \$300; statutory, \$720).

#### Solar and Artificial Projection:

*Object.*—To devise projection apparatus for making magnification of microscopic objects and for improving illustrations and making minute measurements.

*Cooperation.*—Various branches of the department.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Projection apparatus used extensively in measurement of samples of cotton fiber for other offices and in connection with establishment of length standards.

*Assignment.*—N. A. Cobb.

*Proposed expenditures, 1914-15.*—\$1,320 (crop technology, \$720; statutory, \$600).

**Total, Agricultural Technology Investigations,** \$7,120 (crop technology, \$4,080; statutory, \$3,040).

### COTTON GRADING AND STANDARDIZATION.

#### Cotton Grading and Standardization:

*Object.*—To carry on work of distribution of the official cotton grades and to investigate all the elements entering into intrinsic value of cotton, with a view to standardizing them, using the present official cotton grades as a basis.

*Cooperation.*—Growers, cotton mills, and textile schools.

**Cotton Grading and Standardization—Continued.**

*Location.*—Points to be selected in the cotton States; in previous seasons at Harts-ville, S. C.; Florence, S. C.; Mounds, La.; Deeson, Miss.; Waco, Tex., and other points.

*Date begun.*—1907.

*Results.*—Distribution of official grades established by law continued; investigations made looking to establishment of universal standards; length, moisture, temperature, ginning, strength, and clinging quality tests in progress; length types issued to cotton mills in cooperation with Bureau of Census.

*Assignment.*—N. A. Cobb.

*Proposed expenditures, 1914-15.*—\$33,220 (cotton standardization, \$27,800; statutory, \$5,420).

**COTTON TESTING.****Cotton Testing:**

*Object.*—To determine the waste, tensile strength, and bleaching qualities of the different grades of cotton as standardized by the Government.

*Cooperation.*—Riverside and Dan River Cotton Mills, Danville, Va., and textile schools at Clemson College, S. C., and Raleigh, N. C.

*Location.*—As mentioned under "Cooperation."

*Date begun.*—1913.

*Results.*—Spinning tests made and full report of same published, giving waste, tensile strength, and bleaching qualities in the manufacture of yarn from 1-inch cotton of various official grades. Similar tests will be made on a number of lengths other than 1-inch, on cotton below the official grades, and on "mixed packs," and the relationship of compression of cotton to grade and spinning qualities will be studied.

*Assignment.*—N. A. Cobb, D. E. Earle, W. S. Dean.

*Proposed expenditures, 1914-15.*—\$62,160 (cotton testing, \$60,000; statutory, \$2,160).

**Total, Agricultural Technology and Cotton Standardization and Grading Investigations,** \$108,240 (cotton standardization, \$31,000; cotton testing, \$60,000; crop technology, \$4,080; statutory, \$13,160).

**FIBER-PLANT INVESTIGATIONS.****Sisal, Henequin, and Allied Plants:**

*Object.*—Introduction and cultivation of sisal and similar hard-fiber plants in Porto Rico and Hawaii; determination of suitability for culture in Florida, Texas, and Southern California.

*Cooperation.*—Porto Rico Experiment Station; Hawaiian Sisal Company, Ltd.; Florida Sisal and Development Company.

*Location.*—Mayaguez and Yauco, Porto Rico; Sisal and Robinson, Hawaii; St. James City, Fla.; Southern California.

*Date begun.*—1902.

*Results.*—More than 100,000 plants introduced into Porto Rico; many different kinds introduced into Hawaii for comparison with sisal, and at St. James City and Sugar Loaf Key, Fla., and Browns ville, Tex., to note effects of climate and soil; identity and requirements of soil and climate of many kinds of fiber-producing agaves determined; system of strength tests established.

*Assignment.*—Lyster H. Dewey.

*Proposed expenditures, 1914-15.*—\$400 (crop technology, \$300; statutory, \$100).

**Flax Fiber Production:**

*Object.*—To encourage production of flax fiber in this country by developing improved strains of fiber flax; demonstrating possibility of producing good fiber-flaxseed; determination of fertilizers to be used to best advantage.

*Cooperation.*—Minnesota Experiment Station; James Livingston Flax Company, Ltd.; Summers Linen Company.

*Location.*—Arlington, Va., Crookston, Minn., and Yale, Mich.

*Date begun.*—1900.

*Results.*—Several improved strains developed on a small scale; methods of flax breeding devised; production in this country of good seed of fiber flax demonstrated as likely to be successful.

*Assignment.*—Frank C. Miles.

*Proposed expenditures, 1914-15.*—\$2,990 (crop technology, \$2,350; statutory, \$640).

**Hemp Fiber Production:**

*Object.*—To encourage cultivation of hemp in the United States by breeding improved strains, conducting cooperative experiments and demonstrations, and advising about soil, climate, and methods of handling.

*Cooperation.*—Indiana and Wisconsin Experiment Stations.

*Location.*—Arlington, Va.; Nappanee and Pierceton, Ind.; Waupun, Wis.; Lexington, Camp Nelson, and Danville, Ky.

*Date begun.*—1890.

*Results.*—An improved variety of hemp has been developed, recognized by growers in Kentucky as the best they have had in many years. Cooperative experiments and demonstrations in Wisconsin have resulted in the organization of a Hemp Growers' Association. The hemp-growing industry in Indiana has been aided by information about soils, method of handling the crop, markets, etc.

*Assignment.*—Lyster H. Dewey, Frank C. Miles.

*Proposed expenditures, 1914-15.*—\$2,880 (crop technology, \$2,380; statutory, \$500).

**Ramie Fiber Production:**

*Object.*—To determine whether ramie may be successfully and profitably grown in the United States or its island possessions; to investigate methods of handling the crop and preparing the fiber.

*Cooperation.*—Louisiana Experiment Station.

*Location.*—Washington, D. C.; Baton Rouge, La.

*Date begun.*—1890.

*Results.*—Definite data secured regarding yield of fiber and impractical character of decorticating machine thus far devised; many false statements of enthusiastic promoters controverted, and would-be investors saved from wasting money.

*Assignment.*—Lyster H. Dewey, Gertrude M. Johnston.

*Proposed expenditures, 1914-15.*—\$300 (crop technology, \$200; statutory, \$100).

**Miscellaneous Fiber Investigations:**

*Object.*—To collect, record, and disseminate information about all kinds of fiber-producing plants; identify fiber plants and plant fibers; determine strength of various kinds of textile plant fibers, including cotton.

*Location.*—Washington, D. C.

*Date begun.*—1890.

*Results.*—More than 2,000 letters asking about fiber plants of minor importance answered each year; more information on fiber plants on file than anywhere else in the world; thousands of measurements and tests of tensile strength of fibers made.

*Assignment.*—Lyster H. Dewey, Lucille Goodloe.

*Proposed expenditures, 1914-15.*—\$1,280 (crop technology, \$700; statutory, \$580).

**Total, Fiber-Plant Investigations, \$7,850 (crop technology, \$5,930; statutory, \$1,920).**

**GRAIN STANDARDIZATION.****Office and Laboratory:**

*Object.*—Office direction and supervision of investigations relating to grain handling, grading, and transportation of grain, and the fixing of definite grain grades.

*Cooperation.*—Bureau of Chemistry, Bureau of Animal Industry, War Department, Isthmian Canal Commission, North Dakota Agricultural Experiment Station, and various commercial bodies.

*Location.*—Washington, D. C.; headquarters of laboratories outside of Washington at Baltimore, Md., Chicago, Ill., Decatur, Ill., Fargo, N. Dak., Kansas City, Mo., New Orleans, La., and Portland, Oreg.

*Date begun.*—1906.

*Assignment.*—J. W. T. Duvel, E. G. Boerner, G. W. Morrison, and assistants at field laboratories.

*Proposed expenditures, 1914-15.*—\$11,240 (general expenses, \$6,600; statutory, \$4,640).

**Establishment of Definite Grain Grades on the Basis of Intrinsic Value:**

*Object.*—To determine relative value of different factors in grading commercial grain; formulate rules and specifications for standard grades of commercial grains.

*Cooperation.*—Grain trade organizations.

*Location.*—Washington, D. C., and grain markets and ports of the United States.

*Date begun.*—1907.

**Establishment of Definite Grain Grades, etc.—Continued.**

*Results.*—Grades for corn established to take effect July 1, 1914, and investigations relating to establishment of grades for grains other than corn have continued. It is planned to push work on wheat and oats during the coming year.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$7,320 (general expenses, \$6,325; statutory, \$995).

**Effect on Grade and Commercial Value of Farm Methods of Harvesting and Handling Grains:**

*Object.*—To improve the methods of harvesting and handling grain on the farm. Will include milling tests of wheat to show effect of farm methods on quality of flour.

*Cooperation.*—Grain growers.

*Location.*—Washington, D. C., and grain and rice growing sections of United States.

*Date begun.*—1907.

*Results.*—Improved methods of shocking, stacking, cribbing, thrashing, and cleaning grain on the farm demonstrated; data in B. P. I. Circ. 68.

*Assignment.*—J. W. T. Duvel, E. L. Morris, F. B. Wise.

*Proposed expenditures, 1914-15.*—\$7,025 (general expenses, \$6,235; statutory, \$790).

**Handling and Grading Grain at Country Elevators:**

*Object.*—To improve the methods of handling and grading grain at country elevators.

*Cooperation.*—Elevators.

*Location.*—Washington, D. C., and grain belt of Illinois; wheat sections of Middle and Northwestern States.

*Date begun.*—1907.

*Results.*—Bulk of grain marketed by farmers of grain belt shown to have high moisture content. Discrepancies found in grading of like classes of grain at different markets. Section of country to which corn is shipped has important bearing on quality and condition on arrival at destination.

*Assignment.*—J. W. T. Duvel, C. A. Russell.

*Proposed expenditures, 1914-15.*—\$7,875 (general expenses, \$6,885; statutory, \$990).

**Handling and Grading Grain in Terminal Markets:**

*Object.*—To investigate methods of handling and grading grain in terminal markets with a view of placing grading on a definite and uniform basis.

*Cooperation.*—Grain inspection departments, grain dealers, and elevator companies at larger markets.

*Location.*—Washington, D. C., and terminal markets in the United States.

*Date begun.*—1907.

*Results.*—Grading at Baltimore, Chicago, Kansas City, and New Orleans found to be on entirely different basis; no uniformity in same market at different seasons of year. Principal grain exchanges in larger markets use moisture tester developed by the department. Data in B. P. I. Circ. 72.

*Assignment.*—J. W. T. Duvel, L. M. Jeffers, Philip Rothrock, W. P. Carroll, F. L. Morris.

*Proposed expenditures, 1914-15.*—\$14,830 (general expenses, \$13,465; statutory, \$1,365).

**Quality and Condition of American Export Grain:**

*Object.*—To determine quality of export grain at time of loading and of discharge at European ports.

*Cooperation.*—Atlantic steamship companies and grain exchanges at export markets.

*Location.*—American and European ports; headquarters at Washington, D. C.

*Date begun.*—1907.

*Results.*—Cargoes at time of loading and discharge sampled; complaints from European buyers of American grain relating to bad condition of grain on arrival, mixtures, etc., less frequent; data in B. P. I. Circ. 55.

*Assignment.*—J. W. T. Duvel, E. G. Boerner.

*Proposed expenditures, 1914-15.*—\$1,940 (general expenses, \$1,825; statutory, \$115).

**Quality and Condition of Grain Imported into the United States:**

*Object.*—To determine quality and condition of import grain at time of discharge at American ports.

*Cooperation.*—Grain exchanges and individual grain importers at import markets.

*Location.*—Grain receiving ports of United States; headquarters at Washington, D. C.

*Date begun.*—1907.

*Results.*—Cargoes of Argentine corn examined on arrival and moisture content found to be generally low; much of the oats examined found to be of poor quality.

*Assignment.*—J. W. T. Duvel, E. G. Boerner.

*Proposed expenditures, 1914-15.*—\$3,600 (general expenses).

**Deterioration of Export Grain During Transit in Steamships:**

*Object.*—To determine changes which take place in export grain during ocean transit.

*Cooperation.*—Trans-Atlantic steamship companies from ports of Baltimore and New Orleans; European importers.

*Location.*—American and European ports and ocean transportation routes; headquarters, Washington, D. C.

*Date begun.*—1907.

*Results.*—Cargoes of American export grain examined at ports of discharge and changes noted. Investigations show considerable percentage of corn becomes damaged during transit in steamships which can be traced directly to inferior quality and high moisture content at time of loading. Data in B. P. I. Circular 55.

*Assignment.*—J. W. T. Duvel, E. G. Boerner.

*Proposed expenditures, 1914-15.*—\$1,590 (general expenses).

**Deterioration of Grain in Storage and During Transit in Cars:**

*Object.*—To determine degree of deterioration in grain during transit in cars and during storage.

*Cooperation.*—Grain producers, elevator, warehouse, and transportation companies.

*Location.*—Baltimore, New Orleans, and Chicago; laboratory work, Washington, D. C.

*Date begun.*—1907.

*Results.*—Causes of much loss from deterioration determined. Data in B. P. I. Circular 43. Oats storage experiments show that ventilation has considerable influence on keeping qualities.

*Assignment.*—J. W. T. Duvel, L. M. Jeffers, W. P. Carroll.

*Proposed expenditures, 1914-15.*—\$1,850 (general expenses, \$1,685; statutory \$165).

**Shrinkage in Grain While in Storage and Transit:**

*Object.*—To determine amount of shrinkage, in storage or transit, in grain containing various percentages of moisture.

*Cooperation.*—Transportation and elevator companies.

*Location.*—Same as preceding project.

*Date begun.*—1911.

*Results.*—Investigations show that shrinkage during transit or while in storage depends mainly on moisture content, temperature of air, and general atmospheric conditions. Greater shrinkage shown in grain held on track than in that shipped. Data in B. P. I. Circulars 32 and 81; also Department Bulletin No. 48.

*Assignment.*—J. W. T. Duvel, L. M. Jeffers, Philip Rothrock.

*Proposed expenditures, 1914-15.*—\$2,150 (general expenses, \$1,935; statutory, \$215).

**Keeping Qualities of Grain as Influenced by Various Kinds of Storage Bins:**

*Object.*—To determine relative value of various sorts of storage bins and elevators for storage of bulk grain.

*Cooperation.*—Grain elevator and storage companies in Baltimore and Chicago.

*Location.*—Baltimore and Chicago; headquarters at Washington, D. C.

*Date begun.*—1907.

*Results.*—Investigations indicate superiority of wooden bins over concrete bins.

*Assignment.*—J. W. T. Duvel, L. M. Jeffers, W. P. Carroll.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses, \$835; statutory, \$165).

**Artificial Drying of Grain:**

*Object.*—To secure basis for fixing standard grade for artificially dried grain.

*Cooperation.*—Railroad and elevator companies.

*Location.*—Washington and Baltimore.

*Date begun.*—1907.

**Artificial Drying of Grain—Continued.**

*Results.*—Greater loss in handling artificially dried grain than with natural-dried grain; little change in acidity, germination, and chemical composition after drying.

*Assignment.*—J. W. T. Duvel, J. H. Cox.

*Proposed expenditures, 1914-15.*—\$1,670 (general expenses, \$1,550; statutory, \$120).

**Bleaching of Grain:**

*Object.*—To determine influence of bleaching on value of low-grade grain.

*Cooperation.*—Bureau of Animal Industry, and operators of grain bleachers.

*Location.*—Washington, D. C., and Chicago, Ill.

*Date begun.*—1907.

*Results.*—Preliminary investigations made, but without definite results; further tests to be made. Data in B. P. I. Circulars 40, 74, and 111.

*Assignment.*—J. W. T. Duvel, W. P. Carroll.

*Proposed expenditures, 1914-15.*—\$350 (general expenses).

**Mixing of Varieties, Classes, and Commercial Grades of Grain:**

*Object.*—To ascertain natural mixtures as grown, extent of mixing through careless handling on the farm or intentionally by dealers, etc.

*Location.*—Washington, D. C.; Baltimore, Md.; Kansas City, Mo.; Decatur, Ill.; New Orleans, La.; Portland, Oreg.; and various points in corn and wheat belts.

*Date begun.*—1907.

*Results.*—Investigations have shown that the mixing of different varieties, classes, and commercial grades of grain is not an uncommon practice, there being a tendency on the part of some elevators to mix lower grades with the higher, shipping out the total as of the higher grade.

*Assignment.*—J. W. T. Duvel, W. P. Carroll, L. M. Jeffers, F. L. Morris, Philip Rothrock.

*Proposed expenditures, 1914-15.*—\$3,250 (general expenses).

**Milling and Baking Investigations with Various Classes, Varieties, and Grades of Wheat:**

*Object.*—To determine milling value of various kinds and grades of wheat from the same and different geographical sections.

*Cooperation.*—North Dakota Agricultural Experiment Station.

*Location.*—Fargo, N. Dak.; Portland, Oreg.; and wheat belts of United States.

*Date begun.*—1907.

*Results.*—Chemical analyses correlated with milling and baking results, physical appearance, kind and degree of damage, and amount of inseparable impurities. Data in B. P. I. Circulars 68 and 69.

*Assignment.*—L. M. Thomas.

*Proposed expenditures, 1914-15.*—\$6,105 (general expenses, \$5,855; statutory, \$250).

**Harvesting, Handling, Storing, and Grading of Rice:**

*Object.*—To improve present methods of handling and storing rice on the farm, in warehouse, and at the mill, and to establish definite standards for rice.

*Cooperation.*—Southern Rice Growers' Association; Louisiana and Texas Rice Millers' and Distributors' Association; and rice growers, dealers, and millers.

*Location.*—Rice-growing sections of the United States, principally Louisiana, Texas, and Arkansas.

*Date begun.*—1911.

*Results.*—Through investigations made of conditions existing in rice-growing sections; also analyses of rice imported into United States.

*Assignment.*—J. W. T. Duvel, F. B. Wise.

*Proposed expenditures, 1914-15.*—\$3,955 (general expenses).

**Dockage as a Factor in Grain Grading:**

*Object.*—To determine amount of impurities mixed with grain at time of thrashing and marketing, and influence on market value.

*Cooperation.*—Grain growers, receivers, shippers, and inspection departments in United States and Canada.

*Location.*—Grain-growing sections of United States and Canada; headquarters, Washington, D. C.

*Date begun.*—1907.

*Results.*—Investigations and special milling tests show present machinery ordinarily found in mills does not remove impurities (kinghead, rye, barley, wild rose) in cleaning wheat for grinding; also that these impurities result in lowering the color and texture of bread loaves.

*Assignment.*—R. C. Miller.

*Proposed expenditures, 1914-15.*—\$2,790 (general expenses, \$2,600; statutory, \$190).

**Feeding and Manufacturing Value of Sound and Unsound Grain:**

*Object.*—To determine effects on animals of feeding to them damaged grain.

*Cooperation.*—Bureau of Animal Industry.

*Location.*—Washington, D. C., and Bethesda, Md.

*Date begun.*—1907.

*Results.*—Investigations have shown that the difference in gain in weight was very marked with animals fed on sound and unsound corn; no pathological conditions developed. Data in B. P. I. Circulars 40, 74, and 111.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Value of Damaged Grain for the Manufacture of Alcohol:**

*Object.*—To ascertain the value of damaged corn for the manufacture of alcohol.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Only preliminary work undertaken on account of concentration of work on corn grades. Investigations have shown that sound corn yields more proof gallons of alcohol per bushel than heat-damaged corn.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$400 (general expenses).

**Fundamental Causes Responsible for the Deterioration of Grain:**

*Object.*—To investigate molds and bacteria in grain, causing deterioration of grain in storage.

*Cooperation.*—None outside of Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Preliminary investigations have shown that many species of fungi and molds commonly found in corn are destroyed at the high temperature resulting from fermentation of corn when stored in bulk.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$300 (general expenses).

**Grain Values as Influenced by Biochemical Changes Which Take Place After Harvesting and During Storage:**

*Object.*—To ascertain the biochemical changes which take place after harvesting and during storage.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—No definite results determined; only a superficial study being made.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$250 (general expenses).

**Changes in Chemical Composition of Grain During Deterioration:**

*Object.*—To determine changes in chemical composition of grain.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Investigations have shown that in corn that deteriorated during storage there is marked decrease in percentage of acid, a reduction in the sugars, and where deterioration is pronounced, a decrease in percentage of fat. The increase in the acidity of corn is the most important factor in determining the degree of soundness of corn.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$1,150 (general expenses).

**Development of Laboratory Methods for the Determination of Soundness of Grains:**

*Object.*—To develop simple laboratory methods applicable to commercial conditions.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.; Baltimore, Md.; Chicago, Ill.; Decatur, Ill.; Fargo, N. Dak.; Kansas City, Mo.; New Orleans, La.; and Portland, Oreg.

*Date begun.*—1907.

*Results.*—A special apparatus is now practically developed whereby the period of extraction of acid by alcohol has been reduced, approximately, from 16 hours to 30 minutes.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$2,440 (general expenses, \$2,245; statutory, \$195).

**Development of Special Apparatus for Use in Grain Grading:**

*Object.*—To design and develop new apparatus and to improve that now in use.

*Location.*—Same as preceding project.

*Date begun.*—1907.

*Results.*—Special flask developed for determining moisture in flour and meal; slight improvements in apparatus already in use which developed in natural course of the work.

*Assignment.*—J. W. T. Duvel.

*Proposed expenditures, 1914-15.*—\$2,320 (general expenses, \$1,935; statutory, \$385).

**Total, Grain Standardization, \$76,320** (general expenses, \$76,320; statutory, \$10,580).

**BIOPHYSICAL INVESTIGATIONS.****OFFICE AND LABORATORY.****Office and Laboratory:**

*Object.*—Administration of biophysical investigations; reduction of observations and preparation of bulletins; construction and repair of apparatus.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Assignment.*—L. J. Briggs, Julia R. Pearce.

*Proposed expenditures, 1914-15.*—\$5,650 (general expenses, \$3,500; statutory, \$2,150).

**MOISTURE-CONSERVATION INVESTIGATIONS.****Moisture-Conservation Investigations:**

*Object.*—To determine effect of cultivation methods and crop sequence on moisture supply under different climatic conditions in semiarid regions; also to determine the amount of water required for the production of a pound of dry matter for important dry-land crops.

*Location.*—Aberdeen, Idaho; Archer, Wyo.; Ardmore and Newell, S. Dak.; Biggs, Cal.; Burns, Umatilla, and Moro, Oreg.; Chillicothe, Dalhart, San Antonio, and Amarillo, Tex.; Dickinson, Edgeley, Hettinger, Mandan, and Williston, N. Dak.; Colby, Hays, and Garden City, Kans.; Fallon, Nev.; Huntley and Judith Basin, Mont.; Mitchell and North Platte, Nebr.; Nephi, Utah; Tucumcari, N. Mex.; Woodward, Okla.; Yuma, Ariz.; Akron, Colo., and Arlington, Va.

*Date begun.*—1906.

*Results.*—Data in B. P. I. Bul. 188; other reports published and in preparation; studies of water requirements have been in operation three years; one report published and another in press.

*Assignment.*—L. J. Briggs, J. O. Belz, A. B. Campbell, and H. Martin.

*Proposed expenditures, 1914-15.*—\$11,200 (general expenses, \$10,000; statutory, \$1,200).

**SPECIAL BIOPHYSICAL INVESTIGATIONS.****Citrus Malnutrition Investigations:**

*Object.*—To investigate by biophysical methods (a) cause of deterioration of citrus trees; (b) best cultural methods; (c) fertilizer requirements; (d) effect of cement dust on leaves and bloom.

*Location.*—Riverside, Cal., and vicinity.

*Date begun.*—1912.

*Results.*—Results indicate strongly that trouble is due to lack of humus.

*Assignment.*—L. J. Briggs, C. A. Jensen, and J. W. McLane.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses).

**Electrical Method of Determining Moisture Content of Grain:**

*Object.*—The rapid measurement of moisture content of grain for commercial laboratory use.

*Location.*—Baltimore, Md.

*Date begun.*—1910.

*Results.*—Satisfactory data have been obtained with corn and wheat.

*Assignment.*—L. J. Briggs and A. B. Campbell.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Electroculture:**

*Object.*—To determine the extent to which an electrostatic field stimulates plant growth.

*Location.*—Arlington, Va., and Washington, D. C.

*Date begun.*—1909.

*Assignment.*—L. J. Briggs and A. B. Campbell.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Total, Special Biophysical Investigations, \$11,500 (general expenses).**

**Total, Biophysical Investigations, \$28,350 (general expenses, \$25,000; statutory, \$3,350).**

**SEED-TESTING LABORATORIES.****Office:**

*Object.*—To carry on supervisory and clerical work.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—E. Brown, Kate F. Gary.

*Proposed expenditures, 1914-15.*—\$11,640 (general expenses, \$4,000; statutory, \$7,640).

**Seed Testing:**

*Object.*—Testing seeds for mechanical purity and germination and reporting results of analyses for the information of senders.

*Cooperation.*—Missouri, California, and Louisiana Agricultural Experiment Stations, Oregon Agricultural College, and Purdue University.

*Location.*—Washington, D. C.; Columbia, Mo.; Corvallis, Oreg.; Lafayette, Ind.; Berkeley, Cal.; and Baton Rouge, La.

*Date begun.*—1893.

*Results.*—Samples of seed have been tested for mechanical purity and germination and the results of the analyses reported to the persons submitting the samples, affording them the opportunity to know the quality of the seed they are handling or sowing.

*Assignment.*—E. Brown, W. L. Goss, Emma F. Sirrime.

*Proposed expenditures, 1914-15.*—\$15,270 (general expenses, \$14,250; statutory, \$1,020).

**Seed Purity and Vitality Investigations:**

*Object.*—(a) To illustrate and describe the characteristics by which groups of closely related seeds can be distinguished; to prepare sets of authentic samples of seed for distribution; and to make studies of commercial seeds as found on the market. (b) To determine the best methods of testing seeds for germination and the conditions under which seeds should be harvested and stored in order best to preserve their vitality.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Certain groups of seeds have been studied to determine distinguishing characteristics; authentic sets of seeds of economic and wild plants and of weed seeds have been prepared and distributed. The best methods of testing certain classes of seed for germination have been determined, and the conditions of light and darkness with their effect on seed germination have been studied.

*Assignment.*—F. H. Hillman, Geo. T. Harrington.

*Proposed expenditures, 1914-15.*—\$5,230 (general expenses).

**Adulterated Seed Investigations:**

*Object.*—To carry into effect the act of Congress directing that samples of grass and forage-plant seeds be collected, analyzed, and when found to be adulterated the results of the tests published, together with the names of the persons offering the seed for sale.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—The adulteration of red clover and alfalfa seed has practically ceased, and the adulteration of Kentucky bluegrass, orchard grass, and timothy seed has materially decreased.

*Assignment.*—E. Brown, Emma F. Sirrime.

*Proposed expenditures, 1914-15.*—\$3,520 (general expenses).

**Enforcement of Seed Importation Act:**

*Object.*—To carry out the provisions of the seed importation act of August 24, 1912, prohibiting the importation of bluegrass, brome-grass, clover, alfalfa, and certain other specified seeds, containing more than 3 per cent of weed seed, more than 5 per cent adulterants, and, in the case of alfalfa and clover, more than 90 dodder seed per pound.

*Location.*—Washington, D. C., and branch laboratories.

*Date begun.*—1913.

*Results.*—The importation into the United States of seed prohibited under this act has been prevented.

*Assignment.*—E. Brown.

*Proposed expenditures, 1914-15.*—\$1,700 (general expenses).

**Total, Seed-Testing Laboratories,** \$37,360 (general expenses), \$28,700; statutory, \$8,660).

**CEREAL INVESTIGATIONS.****OFFICE AND LABORATORY.****Office and Laboratory:**

*Object.*—To carry on supervisory and clerical work, including correspondence, preparation of reports and manuscripts, photographic work, etc.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—M. A. Carleton, Anna H. B. Kinney.

*Proposed expenditures, 1914-15.*—\$15,400 (general expenses, \$6,900; statutory, \$8,500).

**IMPROVEMENT AND PRODUCTION OF CEREALS AND CEREAL PRODUCTS.****Wheat Investigations:**

*Object.*—To improve the wheat crop through selection and hybridization of varieties; to determine varietal adaptations. It is planned to undertake the study of wheat varieties with reference to classification, to conduct hybridization for special practical ends, and to study inheritance.

*Cooperation.*—New York (Cornell), Maryland, Minnesota, Iowa, Kansas, South Dakota, Montana, Idaho, Utah, and Oregon Experiment Stations; State Board of Farm Commissioners, Cheyenne, Wyo.

*Location.*—Washington, D. C.; Arlington, Va.; College Park, Md.; Ithaca, N. Y.; St. Paul, Minn.; Ames, Iowa; Amarillo, Tex.; Manhattan and Hays, Kans.; Akron, Colo.; Archer, Wyo.; Brookings, Highmore, Eureka, Cottonwood, and Newell, S. Dak.; Dickinson and Williston, N. Dak.; Moccasin, Mont.; Aberdeen, Idaho; Nephi, Utah; Moro and Burns, Oreg.; Biggs and Chico, Cal.

*Date begun.*—1890.

*Results.*—Results published in B. P. I. Circulars 12, 59, 61, and 79, B. P. I. Bulletins 3, 70, 178, 240, 269, and 283, and Yearbook articles 139, 466, and 534; Farmers' Bulletin 596 in press.

*Assignment.*—C. R. Ball, C. E. Leighty.

*Proposed expenditures, 1914-15.*—\$8,374 (general expenses).

**Oat Investigations:**

*Object.*—The improvement of oats by (1) a study of production methods, (2) the breeding of new varieties, and (3) the extension of the winter-oat area.

*Cooperation.*—Iowa and Cornell University Experiment Stations, and to a lesser degree numerous other State stations.

*Location.*—Arlington, Va.; Ithaca, N. Y.; Ames, Iowa; cereal field stations.

*Date begun.*—1902.

*Results.*—Data given in Farmers' Bulletins 395, 420, 424, and 436, B. P. I. Bulletins 182, 240, and 283, B. P. I. Circulars 12, 30, 59, and 61, and Department Bulletins 30 and 39; Department Bulletin 99 in press; some new varieties distributed.

*Assignment.*—C. W. Warburton, W. T. Craig, L. C. Burnett.

*Proposed expenditures, 1914-15.*—\$4,520 (general expenses).

**Barley Investigations:**

*Object.*—The improvement of barley by (1) the breeding of new varieties, (2) study of the physiology of the barley grain, (3) study of production methods, and (4) extension of the barley-growing area.

*Cooperation.*—Minnesota Agricultural Experiment Station, and to a lesser degree other State experiment stations in the barley-growing districts.

**Barley Investigations—Continued.**

*Location.*—Arlington, Va.; St. Paul, Minn.; cereal field stations.

*Date begun.*—1902.

*Results.*—Results published in B. P. I. Circulars 5, 12, 59, 61, and 62, B. P. I. Bulletins 240 and 283, Farmers' Bulletins 427, 443, and 518, and Department Bulletins 30 and 39; some new varieties distributed.

*Assignment.*—H. V. Harlan.

*Proposed expenditures, 1914-15.*—\$3,200 (general expenses).

**Rice Investigations:**

*Object.*—To improve rice through selection and breeding, determine varietal adaptations, study cultural requirements, control the "red rice," and study methods of milling and preparing rice for the market.

*Cooperation.*—Louisiana and Texas Agricultural Experiment Stations; Sacramento Valley Grain Association.

*Location.*—Crowley, La.; Beaumont, Tex.; Biggs, Cal.

*Date begun.*—1905.

*Results.*—Data in B. P. I. Circular 97 on the results of the work in the Sacramento Valley; breeding for resistance to "rotten neck"; control of "red rice" in Louisiana and Texas by rotation with cultivated crops where perfect drainage can be had.

*Assignment.*—C. E. Chambliss, J. M. Jenkins, E. L. Adams.

*Proposed expenditures, 1914-15.*—\$3,226 (general expenses).

**Grain-Sorghum and Broom-Corn Investigations:**

*Object.*—To improve varieties by breeding, determine varietal adaptations, extend the producing area, study cultural requirements, determine human-food value of sorghum meal, and promote commercial handling of these crops.

*Cooperation.*—Kansas and South Dakota Experiment Stations, and to a less extent other State stations.

*Location.*—Amarillo and San Antonio, Tex.; Woodward, Okla.; Hays and Garden City, Kans.; Akron, Colo.; Highmore and Newell, S. Dak.; Moro, Ore.; Biggs, Cal.

*Date begun.*—Grain sorghum, 1905; broom corn, 1911.

*Results.*—Results published in B. P. I. Circulars 30 and 122, B. P. I. Bulletins 175, 203, 237, 253, and 283, and Farmers' Bulletins 322, 448, and 552; Year-book article in press.

*Assignment.*—C. R. Ball, B. E. Rothgeb.

*Proposed expenditures, 1914-15.*—\$2,369 (general expenses).

**Investigations of Minor Cereals:**

*Object.*—The improvement of rye, proso, buckwheat, and quinoa in yield and quality by means of breeding and study of cultural methods.

*Cooperation.*—Kansas, North Dakota, South Dakota, Montana, Utah, Idaho, Oregon, Maryland, Minnesota, and New York (Cornell) experiment stations; Board of Farm Commissioners of Wyoming.

*Location.*—At the stations mentioned under "Cooperation," Archer, Wyo., Arlington, Va., and cereal, dry-land, and irrigation farms of the Bureau of Plant Industry.

*Date begun.*—1898.

*Results.*—Data in B. P. I. Circular 12, B. P. I. Bulletins 240 and 283, and Department Bulletin 30; several improved strains of rye have been distributed; manuscript on rye submitted for publication.

*Assignment.*—M. A. Carleton, C. R. Ball.

*Proposed expenditures, 1914-15.*—\$2,200 (general expenses).

**Investigations in Flaxseed Production:**

*Object.*—To increase the acreage and production of flax and improve the quality of the seed through studies of varieties and of cultural methods, especially with relation to flax-sick soils.

*Cooperation.*—North Dakota, South Dakota, and Montana experiment stations.

*Location.*—Moccasin, Mont.; Mandan, Williston, and Dickinson, N. Dak.; Archer, Wyo.; Akron, Colo.; Highmore and Newell, S. Dak.; Mitchell, Nebr.; Aberdeen, Idaho; Burns, Ore. Minor tests and nursery series at Arlington, Va.; Ithaca, N. Y.; Hays, Kans.; Amarillo and San Antonio, Tex.; Crowley, La.; Moro, Ore.; Biggs and Bard, Cal.; Nephi, Utah; Phoenix, Ariz.; Cottonwood and Eureka, S. Dak.

*Date begun.*—1913.

**Investigations in Flaxseed Production—Continued.**

*Results.*—Histories traced of about 20 varieties previously grown and about 30 new introductions from foreign countries. Over 60 samples of 17 varieties from different points in the Great Plains area have been analyzed for quantity and quality of oil, these data to be correlated with the variation in seed characters when grown under different conditions.

*Assignment.*—C. H. Clark.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Total, Improvement and Production of Cereals and Cereal Products,** \$26,389 (general expenses).

**MAINTENANCE OF GENERAL CEREAL FIELD STATIONS.****Cereal Field Stations in Semiarid Areas:**

*Object.*—To maintain experimental field stations in various sections of the semiarid West; to breed for each section the best cereal varieties and determine proper cropping methods.

*Cooperation.*—Kansas, South Dakota, North Dakota, Montana, Utah, Idaho, and Oregon experiment stations; Board of Farm Commissioners of Wyoming.

*Location.*—Amarillo, Dalhart, and San Antonio, Tex.; Tucumcari, N. Mex.; Manhattan, Hays, Garden City, and Tribune, Kans.; Akron, Colo.; Archer, Wyo.; Brookings, Highmore, Eureka, Cottonwood, and Newell, S. Dak.; Dickinson and Williston, N. Dak.; Moccasin, Mont.; Nephi, Utah; Aberdeen, Idaho; Moro and Burns, Oreg.; Biggs and Chico, Cal.

*Date begun.*—1902.

*Results.*—Most of the cereal field work is conducted at these stations. The results are given in connection with the special investigational projects.

*Assignment.*—M. A. Carleton.

*Proposed expenditures, 1914-15.*—\$47,112 (general expenses, \$42,252; statutory, \$4,860).

**Cereal Field Stations in Humid Areas:**

*Object.*—To maintain cereal field stations in different sections of the humid area; to breed the best adapted cereal varieties and determine the best methods of cereal production for each section.

*Cooperation.*—Maryland, Cornell University, Iowa, and Minnesota experiment stations.

*Location.*—Washington, D. C.; Arlington, Va.; College Park, Md.; Ithaca, N. Y.; St. Paul, Minn.; and Ames, Iowa.

*Date begun.*—1902.

*Results.*—Results are reported under the investigational projects.

*Assignment.*—M. A. Carleton, T. R. Stanton, N. Schmitz, W. T. Craig, T. B. Hutcheson, L. C. Burnett.

*Proposed expenditures, 1914-15.*—\$6,034 (general expenses).

**Total, Maintenance of General Cereal Field Stations,** \$53,146 (general expenses, \$48,286; statutory, \$4,860).

**CEREAL TILLAGE AND ROTATION INVESTIGATIONS.****Tillage and Rotation Investigations:**

*Object.*—To improve the yield and quality of cereals through better cultural methods, seeding methods, and rotations, and to eliminate the necessity of frequent summer fallowing on certain dry lands of the West through rotations with intertilled crops.

*Cooperation.*—Utah, Idaho, and Oregon experiment stations; cooperation with the California and Washington stations to be effected if possible.

*Location.*—Nephi, Utah; Aberdeen, Idaho; Moro and Burns, Oreg.; Biggs, Cal.

*Date begun.*—1904.

*Results.*—Data regarding experiments conducted during the last 10 years in California in B. P. I. Bulletin 182; at Nephi, Utah, since 1907 in B. P. I. Circular 61 and Department Bulletin 30.

*Assignment.*—(Man to be selected.)

*Proposed expenditures, 1914-15.*—\$3,200 (general expenses).

## CEREAL DISEASE INVESTIGATIONS.

**Miscellaneous Cereal Diseases:**

*Object.*—To determine the prevalence and economic importance and investigate the life histories and methods of control of the disease-producing fungi common to rice and other minor cereal crops; to study imperfect fungi parasitic upon cereals and to devise methods of control.

*Cooperation.*—Minnesota and Kansas Experiment Stations.

*Location.*—Washington, D. C., St. Paul, Minn., Manhattan, Kans., Madison, Wis., and cereal field stations.

*Date begun.*—Rice diseases, 1904; imperfect fungi, 1910.

*Results.*—Several species of imperfect fungi, most of which are probably parasitic on small grains, have been isolated and the pathogenicity of many already determined; two rice organisms isolated and found destructive to the plant during the seedling stage; paper entitled "A Study of Some Imperfect Fungi Isolated from Wheat, Oat, and Barley Plants," published in the Journal of Agricultural Research.

*Assignment.*—H. B. Humphrey, J. H. Parker.

*Proposed expenditures, 1914-15.*—\$3,950 (general expenses).

**Cereal Rusts, Related Rust Forms, and Breeding Cereals for Rust Resistance:**

*Object.*—To study the physiology and morphology of cereal rusts and related forms; to breed rust-resistant varieties of cereals, especially wheat.

*Cooperation.*—Iowa, Minnesota, and Kansas Agricultural Experiment Stations.

*Location.*—Washington, D. C., St. Paul, Minn., Manhattan, Kans., Ames, Iowa, and cereal field stations.

*Date begun.*—1894.

*Results.*—Data published in V. P. & P. Bulletin 16, and B. P. I. Bulletins 63, 216, and 224; additional data secured on the question of rust-resistant hybrids.

*Assignment.*—H. B. Humphrey, J. H. Parker, A. A. Potter.

*Proposed expenditures, 1914-15.*—\$2,050 (general expenses).

**Investigations of the Smuts of Corn, Sorghums, and Broom Corn:**

*Object.*—To investigate the life histories and physiology of the smuts of corn, sorghums, and broom corn, devise methods of control, and secure data pertaining to distribution and economic importance of these smuts.

*Cooperation.*—Minnesota and Kansas Agricultural Experiment Stations.

*Location.*—Washington, D. C., Manhattan, Kans., Mitchell, Nebr., St. Paul, Minn., and cereal field stations.

*Date begun.*—1903.

*Results.*—Kernel smut of sorghum found to be preventable, B. P. I. Circular 8; life history of head smut of sorghum discovered and manuscript in press, entitled "Head Smut of Sorghum and Maize," to be published in Journal of Agricultural Research; also paper in manuscript form relative to the systematic position of the kernel smut of sorghum; interesting data bearing upon the method of infection and physiology of corn smut.

*Assignment.*—H. B. Humphrey, A. A. Potter.

*Proposed expenditures, 1914-15.*—\$2,400 (general expenses).

**Investigations of the Smuts of Small Grains:**

*Object.*—To investigate the physiology and distribution of the smuts of small grains, determine incompletely known facts pertaining to their life histories, and improve present methods of smut control and devise new ones.

*Cooperation.*—Minnesota, Kansas, and Washington Experiment Stations.

*Location.*—Washington, D. C., St. Paul, Minn., Manhattan, Kans., Pullman, Wash., and cereal field stations.

*Date begun.*—1890.

*Results.*—Complete control of the cereal smuts worked out; estimated annual preventable loss, \$38,000,000; data in B. P. I. Bulletin 152, Dept. Bulletin 30, and Farmers' Bulletins 219 and 507; loose smut of rye discovered last summer, studied in laboratory, and manuscript in preparation.

*Assignment.*—H. B. Humphrey, A. A. Potter.

*Proposed expenditures, 1914-15.*—\$2,230 (general expenses).

**Total, Cereal Disease Investigations,** \$10,630 (general expenses).

**Total, Cereal Investigations,** \$108,765 (general expenses, \$95,405; statutory, \$13,360).

**CORN INVESTIGATIONS.****Office:**

*Object.*—To provide for clerical and administrative routine, including correspondence, preparation of reports and manuscripts, and other general details connected with the field investigations.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—C. P. Hartley.

*Proposed expenditures, 1914-15.*—\$9,120 (general expenses, \$5,000; statutory, \$4,120).

**Production of Improved Strains of Corn for the Different Geographical Sections of the United States:**

*Object.*—To determine the best practical methods of corn breeding by applying under different environments the results of research work under other projects.

*Cooperation.*—Nebraska Experiment Station and individual farmers.

*Location.*—Throughout United States; special field experiments in Virginia, New York, South Carolina, Ohio, Michigan, Indiana, Mississippi, Louisiana, Arkansas, Missouri, Iowa, Wisconsin, North Dakota, South Dakota, Nebraska, Texas, and California.

*Date begun.*—1900.

*Results.*—Certain methods of corn breeding have been demonstrated to be practical; variation of methods with different environments necessary; several strains of corn of unusual productivity originated or improved and introduced.

*Assignment.*—C. P. Hartley, E. B. Brown, C. H. Kyle, L. L. Zook, J. G. Willier, F. D. Richey, G. J. Burt, and H. S. Garrison.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).

**Corn as Human Food:**

*Object.*—To improve the quality and encourage the use of corn products as human food.

*Cooperation.*—Individual farmers, domestic science schools, millers, etc.

*Location.*—Washington, D. C., and points in States mentioned in preceding project.

*Date begun.*—1910.

*Results.*—Cooking quality and palatability determined for various grades of meal made from various varieties of corn; Farmers' Bulletins 553 and 554 on popcorn.

*Assignment.*—C. P. Hartley, J. G. Willier.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Investigations of the Effects on Corn of Heredity and Environment:**

*Object.*—To investigate the effects of inheritance and environment upon the corn plant, determine general laws governing such phenomena, and improve and develop methods of corn breeding based upon knowledge acquired.

*Cooperation.*—Individual farmers; informally with various agricultural experiment stations.

*Location.*—Observations throughout the United States; field experimentations in Virginia, New York, South Carolina, Ohio, Michigan, Indiana, Mississippi, Louisiana, Arkansas, Missouri, Iowa, Wisconsin, North Dakota, South Dakota, Nebraska, Texas, and California.

*Date begun.*—1901.

*Results.*—Detrimental effects of self-fertilization and crossbreeding demonstrated. Data published in B. P. I. Bulletin 213.

*Assignment.*—C. P. Hartley, E. B. Brown, C. H. Kyle, L. L. Zook, J. G. Willier, F. D. Richey, G. J. Burt, and H. S. Garrison.

*Proposed expenditures, 1914-15.*—\$9,000 (general expenses).

**Tests and Demonstrations of Best General and Practical Methods of Seed-Corn Selection, Fumigation, Drying, and Preservation:**

*Object.*—To develop and improve methods of seed-corn selection, fumigation, drying, and preservation.

*Cooperation.*—Individual farmers.

*Location.*—Points in Virginia, New York, South Carolina, Ohio, Michigan, Indiana, Mississippi, Louisiana, Arkansas, Missouri, Iowa, Wisconsin, North Dakota, South Dakota, Nebraska, Texas, and California.

*Date begun.*—1901.

*Results.*—Greatly increased yields obtained by good seed preservation; benefit secured apparently by early drying of seed; proper preservation influenced by environmental conditions.

*Assignment.*—C. P. Hartley, E. B. Brown, C. H. Kyle, L. L. Zook, J. G. Willier, F. D. Richey, G. J. Burt, and H. S. Garrison.

*Proposed expenditures, 1914-15.*—\$9,000 (general expenses).

**Methods of Corn Culture:**

*Object.*—To determine fundamental principles influencing grain production and stalk growth, with reference to the physical condition of the soil, methods of planting, cultivating, etc.

*Cooperation.*—Individual farmers.

*Location.*—Points in Virginia, New York, South Carolina, Ohio, Michigan, Indiana, Mississippi, Louisiana, Arkansas, Missouri, Iowa, Wisconsin, North Dakota, South Dakota, Nebraska, Texas, and California.

*Date begun.*—1901.

*Results.*—It has been determined that moisture content at ear-forming period is a leading factor in determining yields and that consequently yields are improved by storing and retaining moisture.

*Assignment.*—C. P. Hartley, E. B. Brown, C. H. Kyle, L. L. Zook, J. G. Willier, F. D. Richey, G. J. Burt, and H. S. Garrison.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**Total, Corn Investigations, \$44,120** (general expenses, \$40,000; statutory, \$4,120).

**TOBACCO INVESTIGATIONS.****Office and Laboratory:**

*Object.*—To provide for administrative and clerical routine, including correspondence, preparation of reports and manuscripts, and other general details connected with the field and laboratory investigations.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Assignment.*—W. W. Garner.

*Proposed expenditures, 1914-15.*—\$7,375 (general expenses, \$3,215; statutory, \$4,160).

**New England Cigar-Wrapper Tobacco Investigations:**

*Object.*—To develop principles and methods of breeding, growing, curing, and handling cigar-wrapper tobacco; to study the relation of environment to the development of the tobacco plant.

*Cooperation.*—Connecticut Experiment Station; Harvard University.

*Location.*—Suffield and Tariffville, Conn.

*Date begun.*—1903.

*Results.*—The successful development of curing tobacco by artificial heat, thus securing uniformly good curing, has completely eliminated previous loss to New England growers, estimated at \$1,000,000 annually; definite factors in the improvement of tobacco by breeding ascertained, and three new types of leaf developed.

*Assignment.*—E. G. Beinhart, E. M. East.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Maryland Export Tobacco Investigations:**

*Object.*—To improve the crop by breeding and selection, determine the best use of fertilizers for tobacco, develop best systems of rotation adapted to tobacco, and develop and demonstrate improved methods of growing, curing, and handling tobacco.

*Cooperation.*—Maryland Experiment Station.

*Location.*—Upper Marlboro, Md.

*Date begun.*—1905.

*Results.*—A new type of leaf, almost ideal for Maryland requirements, has been produced by breeding; experiments in soil improvement have disclosed the fundamental needs of tobacco.

*Probable date of completion.*—1919.

*Assignment.*—D. E. Brown.

*Proposed expenditures, 1914-15.*—\$1,350 (general expenses).

**Burley Tobacco Investigations:**

*Object.*—To develop and test new strains of standard tobacco varieties, determine fertilizer requirements and best systems of crop rotation for tobacco, and develop better cultural and curing methods.

*Cooperation.*—Kentucky and West Virginia Experiment Stations.

*Location.*—Lexington, Ky., and Milton, W. Va.

*Date begun.*—Kentucky, 1906; West Virginia, 1913.

*Results.*—Pure strains of the greatest value commercially have been developed, experiments in curing with artificial heat have proven successful, and fertilizer and crop rotation experiments have disclosed valuable information.

**Burley Tobacco Investigations—Continued.***Probable date of completion.*—About 1921.*Assignment.*—R. H. Milton.*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).**Western Fire-Cured Tobacco Investigations:***Object.*—To determine and demonstrate fertilizer requirements and best systems of crop rotation for this type of tobacco, develop and test pure strains of standard fire-cured tobacco varieties, and develop better methods of growing, curing, and handling fire-cured tobacco.*Cooperation.*—Kentucky and Tennessee Experiment Stations.*Location.*—Hopkinsville, Ky., and Clarksville, Tenn.*Date begun.*—Kentucky, 1906; Tennessee, 1912.*Results.*—Experiments have demonstrated that the chief need in this section is a more rational use of fertilizers and an intelligent system of crop rotation.*Assignment.*—R. H. Milton.*Proposed expenditures, 1914-15.*—\$1,400 (general expenses).**New York Binder and Filler Tobacco Investigations:***Object.*—Improvement of the crop by seed selection and development of better methods of growing and handling.*Cooperation.*—New York (Geneva) Experiment Station.*Location.*—Baldwinsville and Big Flats, N. Y.*Date begun.*—1907.*Results.*—Experiments in crop rotation and fertilizers have developed the requirements of the soil in this section.*Probable date of completion.*—1919.*Assignment.*—G. W. Harris.*Proposed expenditures, 1914-15.*—\$1,750 (general expenses).**Sun-Cured, Fire-Cured, and Flue-Cured Tobacco Investigations:****(a) VIRGINIA—***Object.*—To improve native standard tobacco varieties by seed selection, determine and demonstrate the best methods of fertilizing and rotation, and develop better methods of growing, curing, and handling tobacco.*Cooperation.*—Virginia Experiment Station.*Location.*—Bowling Green (sun-cured), Chatham (flue-cured), and Appomattox (fire-cured).*Date begun.*—1907.*Results.*—Fertilizer and crop-rotation experiments have been highly successful; improved methods of curing developed.*Probable date of completion.*—June 30, 1915.*Assignment.*—E. H. Mathewson, W. W. Green, Jno. S. Cunningham.*Proposed expenditures, 1914-15.*—\$1,325 (general expenses).**(b) NORTH CAROLINA—***Object.*—To develop better tobacco varieties by breeding and selection, improve fertilizer, rotation, cultural, and curing methods, and devise methods of controlling Granville wilt.*Cooperation.*—North Carolina Experiment Station.*Location.*—Reidsville, Oxford, and Granville, N. C.*Date begun.*—1909.*Results.*—Improved fertilizer, rotation, and curing methods developed.*Assignment.*—E. H. Mathewson, E. G. Moss, Jno. S. Cunningham, J. O. Evans.*Proposed expenditures, 1914-15.*—\$3,990 (general expenses).**(c) SOUTH CAROLINA—***Object.*—To test and improve by selection native standard tobacco varieties and determine and demonstrate best methods of fertilizing, rotation, and culture.*Cooperation.*—Local boards of trade.*Location.*—Timmons ville and Manning, S. C.*Date begun.*—1910.*Results.*—Improved fertilizer, rotation, and curing methods developed.*Probable date of completion.*—About 1921.*Assignment.*—E. H. Mathewson, J. P. Young, J. R. Walker.*Proposed expenditures, 1914-15.*—\$3,150 (general expenses).**Pennsylvania Cigar-Filler Tobacco Investigations:***Object.*—To improve yield of cigar-filler and binder leaf by breeding and selection, and develop better methods of fertilizing, growing, curing, and handling the crop.

**Pennsylvania Cigar-Filler Tobacco Investigations—Continued.**

*Cooperation.*—Pennsylvania Experiment Station; local growers' associations.

*Location.*—Landisville and Lock Haven, Pa.

*Date begun.*—1910.

*Results.*—Some of the strains of filler leaf are giving large yields, and it is believed that these can be developed into types superior in productiveness to the ordinary varieties; poor burning quality found to be caused by use of fertilizers containing excessive quantities of chlorin; yields increased by higher topping methods; cultural methods being improved.

*Probable date of completion.*—About 1920.

*Assignment.*—Otto Olson, R. W. Wissler.

*Proposed expenditures, 1914-15.*—\$2,800 (general expenses).

**Miscellaneous Tobacco Investigations:**

*Object.*—To study the physiology and chemistry of the tobacco plant in relation to improved methods of growing, curing, fermenting, and handling the crop.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Substantial improvements in methods of curing and fermenting several important types of tobacco; data accumulated regarding various factors controlling nicotine production in tobacco plants.

*Assignment.*—W. W. Garner, C. S. Ridgway, Geo. J. Schulz.

*Proposed expenditures, 1914-15.*—\$2,720 (general expenses).

**Total, Tobacco Investigations, \$29,160** (general expenses, \$25,000; statutory, \$4,160).

**PAPER-PLANT INVESTIGATIONS.****Paper-Plant Investigations:**

*Object.*—To investigate the paper-making value of wild and cultivated plants and crop wastes; investigation of relevant paper-making processes and application to such materials.

*Cooperation.*—Bureau of Chemistry, Forest Service, Bureau of Standards.

*Location.*—Washington, D. C.; field work in several States, especially at Cumberland Mills, Me.

*Date begun.*—1907.

*Results.*—Many materials proved to be of no value; data and paper samples secured from semicommercial tests of 30 different materials; successful commercial test on board manufacture from sorghum bagasse; concluded work on diffusion of cornstalks for stock-food extracts; investigation of paper-making processes prove of practical value as controls; published B. P. I. Circular 82, "Crop Plants for Paper Making."

*Assignment.*—Charles J. Brand, J. L. Merrill.

*Proposed expenditures, 1914-15.*—\$15,540 (general expenses, \$10,840; statutory, \$4,700).

**ALKALI AND DROUGHT RESISTANT PLANT INVESTIGATIONS.****OFFICE AND LABORATORY.****Office and Laboratory:**

*Object.*—To execute administrative affairs and conduct correspondence and laboratory work in connection with investigational projects.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—T. H. Kearney.

*Proposed expenditures, 1914-15.*—\$5,250 (general expenses, \$3,750; statutory, \$1,500).

**BREEDING AND PHYSIOLOGY OF ALKALI AND DROUGHT RESISTANT PLANTS.****Testing and Breeding Alkali-Resistant Crop Plants:**

*Object.*—To ascertain what crop plants are best adapted to alkali land and to obtain by introduction and breeding more resistant varieties.

*Location.*—Arid and semiarid portions of the United States.

*Date begun.*—1907.

*Results.*—The results of several years' investigations of the comparative alkali resistance of different crop plants and practical recommendations regarding what crops to grow on alkali land have been summarized and published in Farmers' Bulletin No. 446.

*Assignment.*—T. H. Kearney, H. L. Shantz.

*Proposed expenditures, 1914-15.*—None, except in so far as this work is covered by other projects.

**Investigating the Physiology of Alkali Resistance and Drought Resistance:**

*Object.*—To investigate the function and structure of crop plants to determine causes of superior resistance of certain species and varieties to alkali and drought and to furnish a physiological basis for plant breeding, variety testing, and investigations of cultural methods.

*Location.*—Laboratory work at Washington, D. C.; field work at experiment farms of Bureau of Plant Industry at Akron, Colo.; Moro, Oreg.; Newell and Ardmore, S. Dak.; Amarillo, Tex.; and Arlington, Va.

*Date begun.*—1908.

*Results.*—The water requirement of numerous crop species and varieties grown in arid regions has been determined and the influence of the climate of different localities upon the water requirement of the same crops measured. The resulting data throw much light upon the adaptability of different crops to dry-land agriculture, upon the duty of water for these crops under irrigation, and upon the effects of different methods of handling crops, especially forage plants, upon their economy of water. The effect of alkali upon the water requirement of wheat and alfalfa has been investigated, the results indicating that alfalfa has the greater power to accommodate itself to the presence of alkali.

*Assignment.*—T. H. Kearney, H. L. Shantz.

*Proposed expenditures, 1914-15.*—\$8,660 (general expenses, \$7,940; statutory, \$720).

**Indicator Value of Native Vegetation in Arid Regions:**

*Object.*—To work out methods of utilizing native vegetation in classifying new land as to agricultural value by establishing correlations between different types of natural growth and soil moisture and alkali conditions of corresponding types of land.

*Location.*—Arid and semiarid portions of the United States—Great Plains and Great Basin.

*Date begun.*—1910.

*Results.*—During the past season reconnoissance in southwestern Utah and northern Nevada developed the fact that the correlations previously established in the Tooele Valley between types of native vegetation and the physical properties and crop-production capabilities of the soil hold good over a much wider area. Several plant associations not present in Tooele Valley were found to dominate large areas in this region and data were obtained as to their value as indicators of the physical properties of the soil.

*Assignment.*—T. H. Kearney, H. L. Shantz.

*Proposed expenditures, 1914-15.*—\$1,760 (general expenses).

**Breeding Drought-Resistant Field Crops:**

*Object.*—To secure more drought-resistant strains of field crops adapted to dry-land agriculture.

*Location.*—Newell and Ardmore, S. Dak., and Akron, Colo.

*Date begun.*—1908.

*Results.*—Seed of improved drought-resistant strains of millet, sorgo, alfalfa, etc., adapted to the northern and central Great Plains was distributed to farmers; improved methods were worked out for testing drought resistance in connection with this work.

*Assignment.*—T. H. Kearney, A. C. Dillman.

*Proposed expenditures, 1914-15.*—\$2,780 (general expenses).

**Pomegranate Breeding and Culture:**

*Object.*—To obtain by introduction and breeding drought-resistant and alkali-resistant varieties of pomegranates.

*Location.*—Sacaton, Ariz.; Indio, Cal.; San Antonio, Tex.; and Washington, D. C.

*Date begun.*—1907.

*Results.*—Plants of those varieties of pomegranates which have given the best results in the experimental nurseries were distributed to growers in the Southwest. Several promising new types of this fruit were discovered among the seedlings which have been grown from imported seed.

*Assignment.*—T. H. Kearney.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Total, Breeding and Physiology of Alkali and Drought Resistant Plants,**  
\$13,700 (general expenses, \$12,980; statutory, \$720).

## EGYPTIAN COTTON BREEDING.

**Egyptian Cotton Breeding and Alkali Resistance Investigations in the Arid Southwest:**

*Object.*—To secure varieties of Egyptian cotton yielding fiber of superior quality and thoroughly adapted to growing under irrigation in the Southwestern United States.

*Cooperation.*—Individual farmers.

*Location.*—Sacaton, Ariz.

*Date begun.*—1907.

*Results.*—The "Yuma" variety of Egyptian cotton, developed in the course of this breeding work, was commercially grown in Arizona last year, with a total production of about 2,200 bales. Arrangements have been completed for cooperation with the associations of growers toward the end of maintaining a supply of pure seed of this variety. A new variety to which the name of "Pima" has been given, having a fiber nearly  $\frac{1}{4}$  inch longer than the "Yuma," has recently been developed and is being grown this year on a sufficiently large scale to provide enough fiber for thorough spinning tests. The prospects are that this variety will also be profitable for commercial growing in Arizona, although on a smaller scale than the "Yuma" variety, owing to the more limited demand for this longer fiber.

*Assignment.*—T. H. Kearney.

*Proposed expenditures, 1914-15.*—\$5,550 (general expenses).

**Total, Alkali and Drought Resistant Plant Investigations, \$24,500** (general expenses, \$22,280; statutory, \$2,220).

SUGAR-BEET INVESTIGATIONS (A).<sup>1</sup>

## OFFICE AND LABORATORY.

**Office and Laboratory:**

*Object.*—To supervise the investigations and carry on administrative and routine clerical and laboratory work incidental thereto.

*Location.*—Washington, D. C.

*Assignment.*—W. A. Orton, H. A. Edson.

*Proposed expenditures, 1914-15.*—\$4,990 (general expenses, \$2,655; statutory, \$2,335).

## SUGAR-BEET DISEASES.

**Leaf-Spot of Sugar Beets:**

*Object.*—To find practical means of controlling sugar-beet leaf-spot on a commercial scale.

*Cooperation.*—American Beet Sugar Co., Madison, Wis.

*Location.*—Rocky Ford, Colo.; Washington, D. C.; and Madison, Wis.

*Date begun.*—1901.

*Results.*—Life history of the disease worked out; fungus overwinters on beet tops and is spread by irrigation water, wind, etc.; controllable by crop rotation and ensiling tops, which kills the fungus.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—Venus W. Pool, M. B. McKay.

*Proposed expenditures, 1914-15.*—\$1,900 (general expenses).

**Damping-Off of Sugar Beets:**

*Object.*—To discover the causes and develop methods for control of damping-off of sugar-beet seedlings.

*Cooperation.*—Wisconsin Experiment Station.

*Location.*—Madison, Wis., and Germany.

*Date begun.*—1906.

*Results.*—Damping-off in the United States due to four fungi; often spread by seed; cultural and soil conditions favoring disease determined; parasites not all the same as in Germany.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—H. A. Edson.

*Proposed expenditures, 1914-15.*—\$930 (general expenses).

<sup>1</sup> Sugar-beet investigations under A will be under the charge of Mr. W. A. Orton, but this work will be closed on Jan. 1, 1915, and all investigations relating to sugar beets will thereafter be directed by Dr. C. O. Townsend. Investigations under the immediate charge of Dr. Townsend and at present under way are outlined under "Sugar-beet investigations (B)."

**Root Rots of Sugar Beets:**

*Object.*—To discover causes and methods of control of root rots of sugar beets.

*Cooperation.*—Wisconsin Experiment Station.

*Location.*—Madison, Wis., and Germany.

*Date begun.*—1906.

*Results.*—Several root-rot fungi isolated and life history being worked out; publications in course of preparation.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—H. A. Edson.

*Proposed expenditures, 1914-15.*—\$930 (general expenses).

**Total, Sugar-Beet Diseases, \$3,760 (general expenses).**

**SUGAR-BEET CULTURE.****Fertilizers for Sugar Beets:**

*Object.*—To determine kind and quantity of fertilizer and time of application for best returns in sugar beets and to investigate the use of green manures.

*Location.*—Garden City, Kans.

*Date begun.*—1904.

*Results.*—Kansas experiments show need for green crops and stable manure, cowpeas being the best green-manuring crop; results from chemicals indeterminate.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—C. F. Clark.

*Proposed expenditures, 1914-15.*—\$405 (general expenses).

**Improvement in Yield and Quality of Sugar Beets:**

*Object.*—To develop strains of sugar beets rich in sugar content and heavy in yield and to grow seed of such strains for commercial purposes.

*Cooperation.*—Minnesota and Idaho experiment stations.

*Location.*—Madison, Wis.; Jerome, Idaho; and Chaska, Minn.

*Date begun.*—1910.

*Results.*—Promising strains developed; some good seed produced; a root planter devised; valuable scientific data on the correlation of character and climatic adaptation secured; effective chemical control organized; two laboratories equipped.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—F. J. Pritchard, L. E. Longley.

*Proposed expenditures, 1914-15.*—\$3,410 (general expenses).

**Cultural Methods for Sugar Beets:**

*Object.*—To work out improved cultural methods for sugar beets with a view to increasing yield and sugar content.

*Cooperation.*—United States Sugar & Land Co.

*Location.*—Garden City, Kans.; Mitchell, Nebr.; Osborn, Mont.; and Newell, S. Dak.

*Date begun.*—1911.

*Results.*—Work under way on distance of planting and thinning, removal of tops, seeding in drills v. hills, rotations, sampling, irrigation, and cultivation.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—C. F. Clark, W. B. Clark.

*Proposed expenditures, 1914-15.*—\$1,215 (general expenses).

**Total, Sugar-Beet Culture, \$5,030 (general expenses).**

**SUGAR-BEET INVESTIGATIONS (B).****Administrative and General Survey:**

*Object.*—To secure and correlate data from the various beet-growing sections of the United States for the purpose of carrying on the investigational work; to determine what relations, if any, exist between the sugar beet and the other farming and live-stock operations now existing in a given territory; to determine what systems of farm rotation and organization have contributed most to the success of a given territory; to determine what crops or live-stock interests have been or may be added that will make the farm unit more profitable; to determine how desirable new lines of agricultural activity can best be introduced and established from an economic standpoint; to adjust all contributing factors, including growing, buying, and marketing of all farm produce and supplies, to their proper place in the farm as a unit and in the community as a whole.

**Administrative and General Survey—Continued.**

*Cooperation.*—With factories, individuals, and organizations.

*Location.*—Washington, D. C., and points in all sugar-beet growing States.

*Date begun.*—July 1, 1914.

*Assignment.*—C. O. Townsend.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).

**Sugar-Beet Investigations:**

*Object.*—To determine the present status of the sugar-beet industry in each general locality where the industry now exists; to determine what the limiting factor or factors for sugar-beet production are in each sugar-beet center; to determine whether or not the limiting factor or factors so far as sugar-beet growing is concerned are surmountable or insurmountable from an economic standpoint, and in cases where the limiting factors appear to be surmountable to determine the most practical methods of control.

*Cooperation.*—Cooperation planned with the Bureaus of Animal Industry and Entomology.

*Location.*—In the five important sugar-producing districts of the United States.

*Date begun.*—July 1, 1914.

*Assignment.*—C. O. Townsend, E. C. Rittue.

*Proposed expenditures, 1914-15.*—\$12,000 (general expenses).

**Total, Sugar-Beet Investigations,** \$33,780 (general expenses, \$31,445; statutory, \$2,335).

**SUGAR-CANE SIRUP PRODUCTION.****Sugar-Cane Sirup Production:**

*Object.*—To investigate and demonstrate methods suitable for the production of a cane sirup that will neither ferment nor granulate; to make economic studies looking toward the establishment and expansion of the cane-sirup industry; to determine the best varieties for sirup production; to study the diseases occurring in sirup-producing sections and work out methods for their control; and to study the utilization of tops and other by-products.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Washington, D. C.; Cairo, Ga.; and points in Florida, Alabama, and Mississippi.

*Date begun.*—July 1, 1914.

*Assignment.*—P. A. Yoder.

*Proposed expenditures, 1914-15.*—\$10,000 (table sirup).

**INVESTIGATIONS IN ECONOMIC AND SYSTEMATIC BOTANY.****OFFICE AND LABORATORY.****Administration:**

*Object.*—This covers the supervisory and routine work of the office and the laboratory, including the investigations carried on in the greenhouses.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C.

*Date begun.*—1868.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—\$6,339 (general expenses, \$4,145; statutory, \$2,194).

**Bibliographical Investigations in the Interest of Botanical Science:**

*Object.*—Improvement of bibliographical facilities for botanical workers in Washington.

*Cooperation.*—Department Library, Library of Congress.

*Location.*—Washington, D. C., and various large libraries in other cities.

*Date begun.*—1868.

*Results.*—Maintenance of most complete botanical catalogue in the United States; assistance rendered investigators of the department conducting special research.

*Assignment.*—Marjorie F. Warner, Alice C. Atwood.

*Proposed expenditures, 1914-15.*—\$2,600 (general expenses, \$200; statutory, \$2,400).

**Total, Office and Laboratory,** \$8,939 (general expenses, \$4,345; statutory, \$4,594).

## RANGE INVESTIGATIONS.

**Range Investigations:**

*Object.*—To develop increased forage in the overgrazed national forests.

*Cooperation.*—Forest Service.

*Location.*—Washington, D. C., and Western States.

*Date begun.*—1907.

*Results.*—Demonstrated that overgrazed areas can be revegetated, without the necessity of closing them to stock, by timing annual grazing to permit seed formation. Sheep fenced in and not herded produce more wool and mutton on less range than by the ordinary methods.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—\$2,304 (general expenses, \$2,071; statutory, \$233).

## ECONOMIC BOTANY OF NATIVE RACES.

**Economic Botany of Mexico, with Special Reference to the Utilization of Valuable Species in the United States:**

*Object.*—To make available for public use information on the useful native plants of Mexico.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C.

*Date begun.*—1899.

*Results.*—Publication on classification of genus *Annona*; other publications in preparation; general information on economic botany of Mexico for utilization by department workers.

*Assignment.*—W. E. Safford.

*Proposed expenditures, 1914-15.*—\$2,685 (general expenses).

**Plants Used by the American Aborigines:**

*Object.*—Recording information possessed by the aborigines regarding the uses of plants.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C., and Western States.

*Date begun.*—1891.

*Results.*—Index and abstracts leading to series of manuscripts for publication partially completed.

*Probable date of completion.*—1924.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—\$2,277 (general expenses).

**Total, Economic Botany of Native Races, \$4,962 (general expenses).**

## BOTANY OF THE ECONOMIC GRASSES.

**Manual of North American Grasses:**

*Object.*—To produce a descriptive manual of the grasses of the United States.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C., and various parts of North America.

*Date begun.*—1905.

*Results.*—A mass of information is being accumulated for use in the forthcoming manual; paper entitled "Mexican Grasses in the United States National Herbarium," published in Contributions to the National Herbarium.

*Probable date of completion.*—1924.

*Assignment.*—A. S. Hitchcock.

*Proposed expenditures, 1914-15.*—\$2,400 (general expenses, \$2,030; statutory, \$370).

**Grass Introduction Index:**

*Object.*—To maintain a card index, containing all references to uses of grasses except the common agricultural uses, references to common names, extracts from notes of travelers, etc., for the purpose of assisting the Office of Foreign Seed and Plant Introduction in securing valuable grasses for introduction into the United States.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Index continued and many cards added.

*Assignment.*—A. S. Hitchcock.

*Proposed expenditures, 1914-15.*—\$620 (general expenses, \$250; statutory, \$370).

**Economic Grass Collections:**

*Object.*—To obtain a collection of native and cultivated grasses of the world as material for study under various grass projects.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C.

*Date begun.*—1868.

*Results.*—Grass herbarium contains about 120,000 sheets; revision of herbarium under way, specimens being arranged geographically, and keys to species of each genus made; duplicates arranged for distribution.

*Assignment.*—A. S. Hitchcock, Agnes Chase.

*Proposed expenditures, 1914-15.*—\$2,595 (general expenses, \$2,225; statutory, \$370).

**Miscellaneous Identification of Grasses:**

*Object.*—Identifying grasses sent in from various sources.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C.

*Date begun.*—1868.

*Results.*—Miscellaneous identifications during 1913 numbered 4,049 specimens.

*Assignment.*—A. S. Hitchcock, Agnes Chase.

*Proposed expenditures, 1914-15.*—\$1,820 (general expenses, \$1,450; statutory, \$370).

**Total, Botany of the Economic Grasses,** \$7,435 (general expenses, \$5,955; statutory, 1,480).

**SYSTEMATIC WORK IN ECONOMIC BOTANY.****Economic Collections:**

*Object.*—Preserving and identifying plants and plant products.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—About 5,000 specimens added to the herbarium; card index of desiderata now in preparation, which will include cultivated plants not already in collection.

*Assignment.*—P. L. Ricker.

*Proposed expenditures, 1914-15.*—\$1,739 (general expenses, \$469; statutory, \$1,270).

**Systematic Botany of the Fruits and Nuts Cultivated in America:**

*Object.*—An accurate classification of the horticultural varieties and species of fruits and nuts cultivated in America.

*Location.*—Washington, D. C., and various parts of the United States.

*Date begun.*—1909.

*Results.*—Some data accumulated, but work temporarily suspended.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—No allotment; incidental to other projects at present.

**Botanical Origin and Varietal Classification of the Potato:**

*Object.*—To determine the species from which the cultivated potato has been derived.

*Location.*—Washington, D. C., and Europe.

*Date begun.*—1908.

*Results.*—Preliminary data accumulated; work temporarily suspended.

*Probable date of completion.*—1918.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—No allotment; incidental to other projects at present.

**Economic Monograph of the Heather and Blueberry Families, with Special Reference to Their Utilization in the United States:**

*Object.*—Domestication of the blueberry and other plants of these families.

*Cooperation.*—Blueberry growers.

*Location.*—Washington, D. C., New England, New Jersey, Indiana.

*Date begun.*—1908.

*Results.*—A new industry, blueberry culture, in course of establishment; 20,000 hybrids from selected wild plants on hand; methods of commercial propagation worked out.

*Probable date of completion.*—1915.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—\$1,640 (general expenses, \$1,407; statutory, \$233).

**Systematic Botany of the Forage Plants Cultivated in America, Exclusive of the Grasses:**

*Object.*—To publish taxonomic information on plant cultivation for forage in the United States.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Many identifications made and assistance furnished to forage-plant breeders and experimenters.

*Probable date of completion.*—1918.

*Assignment.*—P. L. Ricker.

*Proposed expenditures, 1914-15.*—\$1,071 (general expenses, \$896; statutory, \$175).

**Ornamental Trees and Shrubs in the American Nursery Trade:**

*Object.*—To devise an accurate classification for these plants.

*Cooperation.*—Nurserymen.

*Location.*—Washington, D. C., and various parts of the United States.

*Date begun.*—1910.

*Results.*—Assistance to nurserymen and horticulturists; hydrangea, berberis, and magnolia material studied, and over 200 specimens collected.

*Assignment.*—A. H. Moore.

*Proposed expenditures, 1914-15.*—\$1,464 (general expenses).

**Monograph of the Grossulariaceæ, with Special Reference to the Species Useful in the United States:**

*Object.*—An accurate classification of the American gooseberries and currants.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Work confined for present to accumulation of data through receipt and identification of specimens.

*Assignment.*—Frederick V. Coville.

*Proposed expenditures, 1914-15.*—No allotment.

**Miscellaneous Identifications:**

*Object.*—Identification of material submitted from various sources.

*Cooperation.*—Forest Service, various State stations, and correspondents.

*Location.*—Washington, D. C.

*Date begun.*—1868.

*Results.*—During 1913 there were 3,840 miscellaneous identifications made, a large proportion for the Forest Service.

*Assignment.*—P. L. Ricker, A. H. Moore, Ivar Tidestrom.

*Proposed expenditures, 1914-15.*—\$2,536 (general expenses, \$2,361; statutory, \$175).

**Records of the Origin and Character of Varieties of Ornamental Plants Originating Under Cultivation:**

*Object.*—To secure uniformity of nomenclature and accuracy of descriptions in trade catalogues.

*Cooperation.*—Horticulturists.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Index of varieties is maintained, which is much used by various offices of the department.

*Assignment.*—P. L. Ricker.

*Proposed expenditures, 1914-15.*—\$70 (general expenses).

**Total, Systematic Work in Economic Botany, \$8,520** (general expenses, \$6,667; statutory, \$1,853).

**Total, Investigations in Economic and Systematic Botany, \$32,160** (general expenses, \$24,000; statutory, \$8,160).

**FARM-MANAGEMENT INVESTIGATIONS.****ADMINISTRATION.****Administration:**

*Object.*—To supervise the investigations relating to farm management and provide for clerical and administrative routine, including correspondence, keeping of financial records, preparation of reports and manuscripts, maintenance of library files, preparation of photographic and illustrative material, maintenance of property and supplies, etc.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Assignment.*—W. J. Spillman, Lisle Morrison.

*Proposed expenditures, 1914-15.*—\$40,101 (general expenses, \$22,461; statutory, \$17,640).

## FARM ECONOMICS.

**Cost-Accounting Investigations:**

*Object.*—To determine the cost of different farm enterprises in their relation to farms as a unit; to devise suitable cost-accounting methods.

*Cooperation.*—Ohio, Wisconsin, Minnesota, and New York agricultural colleges, and private farmers.

*Location.*—Various parts of country, mainly in the States named under "Cooperation."

*Date begun.*—1906.

*Results.*—Large amount of data collected relative to farm organization; two publications issued, one on farm cost accounting and the other on the cost of production of dairy animals.

*Assignment.*—C. M. Bennett.

*Proposed expenditures, 1914-15.*—\$37,552 (general expenses, \$33,152; statutory, \$4,400).

**Farm-Management Surveys:**

*Object.*—To study individual farms in their relation to other farms, and to determine the more profitable types of farming for given regions.

*Location.*—Pennsylvania, Oregon, Utah, Georgia, and other States.

*Date begun.*—1909.

*Results.*—Financial records from over 2,700 farms collected; analyses made of these records to show the reasons for profits in farming; two publications issued, one on the results of a survey in the corn-belt States, the other on a survey in Utah; other manuscripts in preparation.

*Assignment.*—H. M. Dixon.

*Proposed expenditures, 1914-15.*—\$12,180 (general expenses, \$10,440; statutory, \$1,740).

**Farm Equipment:**

*Object.*—To determine the cost and character of equipment necessary for farms of different type and sizes in different locations.

*Location.*—General.

*Date begun.*—1906.

*Results.*—Data relative to equipment in various States collected and prepared for publication; bulletin on time required to perform farm operations published.

*Assignment.*—H. H. Mowry.

*Proposed expenditures, 1914-15.*—\$13,605 (general expenses, \$12,405; statutory, \$1,200).

**Farm Structures:**

*Object.*—To collect data and devise plans for farm buildings suited to the needs of the farmer according to the size of farm and location.

*Location.*—General.

*Date begun.*—1913.

*Results.*—Work organized and plans for farm dwellings for certain conditions perfected.

*Assignment.*—W. A. Etherton.

*Proposed expenditures, 1914-15.*—\$11,960 (general expenses).

**Farm Home Studies:**

*Object.*—To determine the cost of the farmer's living, and to study those factors contributing to the welfare of the farm home.

*Location.*—Jacksonville, Ill., and in other States.

*Date begun.*—1912.

*Results.*—Detailed records from a number of farms collected and tabulated; manuscript in course of preparation.

*Assignment.*—Ilena M. Bailey.

*Proposed expenditures, 1914-15.*—\$3,320 (general expenses).

**Total, Farm Economics, \$78,617** (general expenses, \$71,277; statutory, \$7,340).

## SPECIAL FARM-MANAGEMENT STUDIES.

**Tenant Farming in Relation to Farm Management:**

*Object.*—To study the systems of tenant farming employed in the United States, for the purpose of ascertaining equitable relations between landlord and tenant.

*Cooperation.*—Iowa Experiment Station.

*Location.*—Ames, Iowa, and general throughout the United States; headquarters, Washington, D. C.

**Tenant Farming in Relation to Farm Management—Continued.***Date begun.*—1909.*Results.*—Bulletin, prepared in cooperation with the Iowa Experiment Station, nearing completion.*Assignment.*—E. A. Boeger.*Proposed expenditures, 1914-15.*—\$7,190 (general expenses, \$5,990; statutory, \$1,200).**Weeds and Tillage in Relation to Farm Management:***Object.*—To decide upon the cheapest and most effective methods of eradicating weeds and tilling the soil.*Cooperation.*—Individual farmers in the States named under "Location."*Location.*—Headquarters, Washington, D. C.; Pennsylvania, Oregon, Kentucky, Texas, South Carolina, Michigan, Washington, Nebraska, New Hampshire, Connecticut, West Virginia, Ohio, Louisiana, Missouri, Indiana, Maine, and New York; also experimental work at Arlington, Va.*Date begun.*—1905.*Results.*—The following publications have been issued: B. P. I. Doc. 416, B. P. I. Cir. 94, B. P. I. Bul. 257, Farmers' Bulletins 279, 368, 464, and 545. Manuscripts for Farmers' Bulletins, entitled "How to control weeds" and "The wild onion or garlic," submitted for publication.*Assignment.*—H. R. Cox.*Proposed expenditures, 1914-15.*—\$9,560 (general expenses, \$8,840; statutory, \$720).**Making and Utilization of Hay in Relation to Farm Management:***Object.*—To study farm practices in the growing, curing, handling, baling, and marketing of hay, and the artificial curing of hay.*Cooperation.*—In the experiments in curing hay by artificial means cooperation has been carried on with T. P. Russell, of Hayti, Mo.*Location.*—Study of farm practices throughout the country; hay-drying plant located at Hayti, Mo.; headquarters, Washington, D. C.*Date begun.*—1904.*Results.*—The experiments with the hay-drying plant have been completed so far as the old plant is concerned, and before the work can progress farther a new drier must be erected. Data in Farmers' Bulletins 362 and 508 and B. P. I. Circular 116.*Assignment.*—H. B. McClure.*Proposed expenditures, 1914-15.*—\$4,180 (general expenses).**Maintenance and Utilization of Pastures in Relation to Farm Management:***Object.*—To determine the best methods of maintaining the carrying capacity of pastures, and to determine the cost of pastures and their relative value as compared with land devoted to harvested crops.*Cooperation.*—Massachusetts Experiment Station, and farmers in New England and in New York.*Location.*—Headquarters, Washington, D. C.; experiments in the New England States and New York; investigations conducted on farms and ranches throughout the United States.*Date begun.*—1902.*Results.*—Experimental work completed and reports made; field studies made with a view to ascertaining the relations of pastures to the farm organization.*Assignment.*—J. S. Cotton.*Proposed expenditures, 1914-15.*—\$1,700 (general expenses).**Farm Practices in Relation to Farm Yields:***Object.*—To study the relation existing between the various types of farming and the maintenance of soil fertility.*Cooperation.*—Kentucky Experiment Station.*Location.*—Headquarters, Washington, D. C.; surveys conducted in Illinois and New Hampshire and experiments in Kentucky; work to be extended to Pennsylvania, Virginia, West Virginia, and Maryland.*Date begun.*—1912.*Results.*—About 500 farms in Illinois and New Hampshire have been studied and results tabulated; another year's records have been obtained from the Kentucky Experiment Station.*Assignment.*—D. A. Brodie.*Proposed expenditures, 1914-15.*—\$8,140 (general expenses, \$5,540; statutory, \$2,600).

**Relation of Geographic Factors to Farm Enterprises:**

*Object.*—To study the relation of geographic and climatic influences to farm enterprises, in order to determine the systems of farming best adapted to a given region and to make the results of these investigations available to the public through the publication of an "Atlas of American Agriculture."

*Cooperation.*—University of Wisconsin and Bureau of Statistics.

*Location.*—Headquarters, Washington, D. C.; field work at Madison, Wis.

*Date begun.*—1912.

*Results.*—Data collected from every available source being tabulated and mapped in graphic form preparatory to the publication of the atlas.

*Assignment.*—O. E. Baker.

*Proposed expenditures, 1914-15.*—\$24,460 (general expenses, \$16,800; statutory, \$7,660).

**Farm Enterprises Involving the Keeping of Live Stock:**

*Object.*—To ascertain the crop and economic conditions that control the distribution of live-stock enterprises.

*Cooperation.*—Bureau of Animal Industry.

*Location.*—Headquarters, Washington, D. C.; investigations to be carried on throughout the United States.

*Date begun.*—January, 1914.

*Assignment.*—J. S. Cotton.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Total, Special Farm-Management Studies, \$56,730** (general expenses, \$44,550; statutory, \$12,180).

**FARM-MANAGEMENT FIELD STUDIES.****Farm Organization in the Northeastern States:**

*Object.*—To study farm organization and administration to the end of securing information which will make possible the proper coordination of the enterprises of the farm.

*Location.*—Northeastern States.

*Date begun.*—July 1, 1914.

*Assignment.*—J. S. Cates.

*Proposed expenditures, 1914-15.*—\$17,606 (general expenses, \$17,006; statutory, \$600).

**Farm Organization in the North-Central States:**

*Object.*—Same as preceding project.

*Location.*—North-Central States.

*Date begun.*—July 1, 1914.

*Assignment.*—J. C. McDowell.

*Proposed expenditures, 1914-15.*—\$21,346 (general expenses, \$20,746; statutory, \$600).

**Farm Organization in the Western States:**

*Object.*—Same as preceding project.

*Location.*—Western States.

*Date begun.*—July 1, 1914.

*Assignment.*—D. A. Brodie.

*Proposed expenditures, 1914-15.*—\$13,665 (general expenses, \$13,065; statutory, \$600).

**Farm Organization in the Southern States:**

*Object.*—Same as preceding project.

*Location.*—Southern States.

*Date begun.*—July 1, 1914.

*Assignment.*—C. L. Goodrich.

*Proposed expenditures, 1914-15.*—\$40,075 (general expenses, \$39,475; statutory, \$600).

**Total Farm-Management Field Studies, \$92,692** (general expenses, \$90,292; statutory, \$2,400).

## HISTORY OF FARM MANAGEMENT.

**History of Farm Management:**

*Object.*—To study previous agricultural practices in this and other countries and possible application in modern agriculture.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Data relative to English and Roman agriculture prepared and nearly ready for publication.

*Assignment.*—L. G. Connor.

*Proposed expenditures, 1914-15.*—\$2,240 (general expenses).

## UTILIZATION OF CACTI AND DRY-LAND PLANTS.

**Cactus Investigations:**

*Object.*—To study the cactus plant and its use as a forage crop and as human food.

*Location.*—Mainly in the Southwest and in Mexico.

*Date begun.*—1902.

*Results.*—Data in B. P. I. Bulletins 74, 91, 102, 116, 124, 140, and 177; Farmers' Bulletin 483 and Department Bulletin 31.

*Assignment.*—David Griffiths.

*Proposed expenditures, 1914-15.*—\$7,560 (general expenses, \$5,160; statutory, \$2,400).

**Range-Land Investigations:**

*Object.*—To determine the carrying capacity of ranges, restore overstocked ranges, and investigate range management under different conditions.

*Cooperation.*—Forest Service and private individuals.

*Location.*—Mainly in Southwestern States.

*Date begun.*—1902.

*Results.*—Data in B. P. I. Bulletins 4, 15, 38, 67, and 117; two others in hand.

*Assignment.*—David Griffiths, E. O. Wooten.

*Proposed expenditures, 1914-15.*—\$4,020 (general expenses).

**Total, Utilization of Cacti and Dry-Land Plants,** \$11,580 (general expenses, \$9,180; statutory, \$2,400).

## CLEARING AND UTILIZATION OF LOGGED-OFF LANDS.

**Clearing and Utilization of Logged-Off Lands:**

*Object.*—To ascertain the most effective and cheapest methods of clearing logged-off land of stumps and putting it into condition for cultivation.

*Location.*—Headquarters, Washington, D. C.; timbered sections of the country.

*Date begun.*—1908.

*Results.*—Published in B. P. I. Bulletin 239, B. P. I. Circular 25, Farmers' Bulletins 462 and 600, and Department Bulletin 91.

*Assignment.*—Harry Thompson, Earl D. Strait.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Total, Farm-Management Investigations,** \$286,960 (farm management, \$230,820; cacti, \$9,180; logged-off lands, \$5,000; statutory, \$41,960).

## FARM DEMONSTRATIONS OUTSIDE OF COTTON BELT.

**Supervision:**

*Object.*—To carry on supervisory, clerical, and routine work necessary to properly conduct the demonstration work in the Northern and Western States.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Assignment.*—C. B. Smith.

*Proposed expenditures, 1914-15.*—\$16,000 (general expenses, \$10,000; statutory, \$6,000).

**Demonstration Work in the North Atlantic States:**

*Object.*—To carry on cooperative farm demonstration work in the North Atlantic States.

*Cooperation.*—State colleges and county organizations in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Delaware.

*Location.*—States named under "Cooperation."

*Date begun.*—1912.

**Demonstration Work in the North Atlantic States—Continued.**

*Results.*—The larger phases of the county agents' work have been summarized, showing the value of such work in a concrete form. Counties are constantly organizing and Federal aid is given as far as funds will permit. Farm organization and administration have been studied with a view to securing the proper coordination of the enterprises of the farm, and the best known practices in agriculture have been carried to the farmers.

*Assignment.*—C. B. Smith, assisted by L. A. Clinton.

*Proposed expenditures, 1914-15.*—\$108,280 (general expenses).

**Demonstration Work in the North-Central States:**

*Object.*—To carry on cooperative farm demonstration work in the North-Central States.

*Cooperation.*—State colleges and county organizations in Michigan, Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, and Ohio.

*Location.*—States named under "Cooperation."

*Date begun.*—1912.

*Results.*—Same as preceding project.

*Assignment.*—C. B. Smith, assisted by W. A. Lloyd.

*Proposed expenditures, 1914-15.*—\$157,475 (general expenses).

**Demonstration Work in the Western States:**

*Object.*—To carry on cooperative farm demonstration work in the Western States.

*Cooperation.*—State colleges and county organizations in Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Idaho, Nevada, Washington, Oregon, and California.

*Location.*—States named under "Cooperation."

*Date begun.*—1912.

*Results.*—Same as preceding project.

*Assignment.*—C. B. Smith, assisted by D. W. Working.

*Proposed expenditures, 1914-15.*—\$67,750 (general expenses).

**Boys' and Girls' Club Work in the Northern and Western States:**

*Object.*—To interest boys and girls in the 38 Northern and Western States in farm and farm-home problems, and to teach them better methods of farm and garden practice.

*Cooperation.*—State agricultural colleges, public schools, granges, business organizations, and citizens.

*Location.*—General.

*Date begun.*—1912.

*Results.*—During the past year 8 State cooperative agents in charge of boys' and girls' club work and 15 collaborators in local areas have been employed; interest in the work has been stimulated; total enrollment, 110,077, in corn, garden and canning, canning and marketing, potato, alfalfa, and apple clubs.

*Assignment.*—C. B. Smith, assisted by O. H. Benson.

*Proposed expenditures, 1914-15.*—\$56,495 (general expenses).

**Total, Farm Demonstrations Outside of Cotton Belt, \$406,000 (general expenses, \$400,000; statutory, \$6,000).**

**FARMERS' COOPERATIVE DEMONSTRATION WORK.****Administration:**

*Object.*—Supervision, direction, and control of field forces engaged in the Farmers' Cooperative Demonstration Work in the South.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—Bradford Knapp, J. A. Evans, H. W. Barber.

*Proposed expenditures, 1914-15.*—\$87,240 (general expenses, \$56,740; statutory, \$30,500).

**Demonstration Work in Texas:**

*Object.*—Systematic instruction of the farmer and his family, on his own farm, in the established principles of successful farming and animal husbandry, with special reference to boll-weevil conditions in cotton territory; in home economics, rural sanitation and health, cooperation, community improvement, and other things tending to promote a more profitable and satisfying rural life.

**Demonstration Work in Texas—Continued.**

*Cooperation.*—Texas Agricultural and Mechanical College and other schools; counties, boards of trade, private citizens.

*Location.*—Texas.

*Date begun.*—1904.

*Results.*—Widespread adoption of better methods and systems of farming, use of more horsepower with improved implements, and general improvement in rural conditions.

*Assignment.*—W. F. Proctor (State agent).

*Proposed expenditures, 1914-15.*—\$72,500 (general expenses).

**Demonstration Work in Oklahoma:**

*Object.*—Same as preceding project.

*Cooperation.*—Counties, agricultural associations, bankers, business men, and others.

*Location.*—Oklahoma.

*Date begun.*—1904.

*Results.*—Same as preceding.

*Assignment.*—W. D. Bentley (State agent).

*Proposed expenditures, 1914-15.*—\$42,000 (general expenses).

**Demonstration Work in Arkansas:**

*Object.*—Same as preceding project.

*Cooperation.*—Same as preceding project.

*Location.*—Arkansas.

*Date begun.*—1904.

*Results.*—Same as preceding project.

*Assignment.*—C. W. Watson (State agent).

*Proposed expenditures, 1914-15.*—\$40,000 (general expenses).

**Demonstration Work in Louisiana:**

*Object.*—Same as preceding project.

*Cooperation.*—Louisiana State University, parish police juries, commercial bodies, and others.

*Location.*—Louisiana.

*Date begun.*—1904.

*Results.*—Confidence in ability to grow cotton in spite of boll weevil largely restored; interest in better live stock and diversification encouraged; great improvement in general agricultural conditions.

*Assignment.*—Mason Snowden (State agent).

*Proposed expenditures, 1914-15.*—\$42,000 (general expenses).

**Demonstration Work in Mississippi:**

*Object.*—Same as preceding project.

*Cooperation.*—Mississippi Agricultural and Mechanical College, counties, commercial organizations, and others.

*Location.*—Mississippi.

*Date begun.*—1906.

*Results.*—Great interest in diversification aroused, especially in winter cover crops and legumes; production of more and better live stock encouraged; confidence in ability to grow cotton under boll weevil conditions restored; local cooperation greatly increased.

*Assignment.*—R. S. Wilson (State agent).

*Proposed expenditures, 1914-15.*—\$45,000 (general expenses).

**Demonstration Work in Alabama:**

*Object.*—Same as preceding project.

*Cooperation.*—Alabama State Board of Agriculture, Alabama Polytechnic Institute, and county organizations.

*Location.*—Alabama.

*Date begun.*—1906.

*Results.*—Demoralization on account of the coming of the boll weevil overcome; diversification and better farming methods being generally adopted; great interest aroused in production of more and better live stock.

*Assignment.*—R. L. Watt (State agent).

*Proposed expenditures 1914-15.*—\$46,000 (general expenses).

**Demonstration Work in Georgia:**

*Object.*—Same as preceding project.

*Cooperation.*—Georgia State College of Agriculture, county organizations, and others.

*Location.*—Georgia.

*Date begun.*—1907.

*Results.*—Farmers induced to prepare for the coming of the boll weevil by the adoption of better methods of farming and the diversification of crops; the production of home supplies more generally practiced; interest in more and better live stock aroused.

*Assignment.*—J. Phil Campbell (State agent).

*Proposed expenditures, 1914-15.*—\$50,000 (general expenses).

**Demonstration Work in Florida:**

*Object.*—Same as preceding project.

*Cooperation.*—Florida State Board of Agriculture, the State University, county organizations, school boards, women's clubs, citizens, and others.

*Location.*—Florida.

*Date begun.*—1908.

*Results.*—Same as preceding project.

*Assignment.*—C. K. McQuarrie (State agent).

*Proposed expenditures, 1914-15.*—\$26,000 (general expenses).

**Demonstration Work in South Carolina:**

*Object.*—Same as preceding project.

*Cooperation.*—Clemson Agricultural College, Winthrop College, county organizations, business men's clubs, and others.

*Location.*—South Carolina.

*Date begun.*—1907.

*Results.*—Widespread adoption of diversification, including winter cover crops and legumes as a means of soil building; cooperation with common schools and churches, by this and other means arousing interest in better methods of farming and improvement of rural-life conditions.

*Assignment.*—W. W. Long (State agent).

*Proposed expenditures, 1914-15.*—\$40,000 (general expenses).

**Demonstration Work in North Carolina:**

*Objects.*—Same as preceding project.

*Cooperation.*—North Carolina Agricultural and Mechanical College, State Board of Agriculture, State Experiment Station, county boards of supervisors, business men's associations, and others.

*Location.*—North Carolina.

*Date begun.*—1907.

*Results.*—Better methods of farming generally adopted; great interest aroused in the production of legumes and winter cover crops and more and better live stock.

*Assignment.*—C. R. Hudson (State agent).

*Proposed expenditures, 1914-15.*—\$41,000 (general expenses).

**Demonstration Work in Virginia:**

*Object.*—Same as preceding project.

*Cooperation.*—United Board of Agriculture of Virginia and various county boards of supervisors, and business men's and farmers' organizations.

*Location.*—Virginia.

*Date begun.*—1907.

*Results.*—Same as preceding project

*Assignment.*—T. O. Sandy (State agent).

*Proposed expenditures, 1914-15.*—\$40,000 (general expenses).

**Demonstration Work in Tennessee:**

*Object.*—Same as preceding project.

*Cooperation.*—Counties, business men, bankers' associations, and others.

*Location.*—Tennessee.

*Date begun.*—1909.

*Results.*—Great progress made in securing adoption of better farming methods, including diversification, the use of legumes, and the production of more and better live stock.

*Assignment.*—H. D. Tate (State agent).

*Proposed expenditures, 1914-15.*—\$40,000 (general expenses).

**Demonstration Work in West Virginia:**

*Object.*—Same as preceding project.

*Cooperation.*—West Virginia College of Agriculture and local organizations.

*Location.*—West Virginia.

*Date begun.*—1913.

*Results.*—Increased interest in better farming methods and the development of community spirit between city and country.

*Assignment.*—Nat T. Frame (State agent).

*Proposed expenditures, 1914-15.*—\$25,000 (general expenses).

**Demonstration Work in Kentucky:**

*Object.*—Same as preceding project.

*Cooperation.*—College of Agriculture, State Department of Agriculture, State Normal College, boards of trade, and private individuals.

*Location.*—Kentucky.

*Date begun.*—1913.

*Results.*—Unusually successful in securing cooperation of all forces in the State and in arousing widespread interest in the necessity for adoption of better methods of farming.

*Assignment.*—Fred Mutchler (State agent).

*Proposed expenditures, 1914-15.*—\$45,000 (general expenses).

**Demonstration Work in Maryland:**

*Object.*—Same as preceding project.

*Cooperation.*—Maryland Agricultural College, counties, commercial bodies, and others.

*Location.*—Maryland.

*Date begun.*—1911.

*Results.*—Better methods of farming generally adopted; great interest aroused in the production of legumes and winter cover crops and better live stock.

*Assignment.*—August Stabler (State agent).

*Proposed expenditures, 1914-15.*—\$22,000 (general expenses).

**Total, Farmers' Cooperative Demonstration Work, \$703,740** (general expenses, \$673,240; statutory, \$30,500).

**DRY-LAND AGRICULTURE INVESTIGATIONS.****Supervisory and Office Work:**

*Object.*—To supervise the maintenance of field stations and direct the agricultural work in dry-land areas of the Great Plains region, furnish facilities for investigational activities, and conduct routine office work.

*Cooperation.*—Experiment stations of North Dakota, Nebraska, Montana, Colorado, and Kansas, United States Reclamation Service and Forest Service.

*Location.*—Washington, D. C., and Denver, Colo.

*Date begun.*—1905.

*Assignment.*—E. C. Chilcott, J. S. Cole, W. W. Burr, C. W. Adams.

*Proposed expenditures, 1914-15.*—\$23,840 (general expenses, \$20,400; statutory, \$3,440).

**Akron (Colo.) Field Station:**

*Object.*—To determine the best methods of soil cultivation and crop rotations for the conservation of moisture and maintenance of humus in the soils of the Great Plains area.

*Cooperation.*—Citizens Association of Akron, Colo., experiment stations, and Forest Service.

*Location.*—About 4 miles from Akron, Colo.

*Date begun.*—1907.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—O. J. Grace, A. E. Seamans.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).

**Amarillo (Tex.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Chamber of Commerce, Amarillo, Tex.

*Location.*—About 1½ miles from Amarillo, Tex.

*Date begun.*—1906.

*Results.*—Data published in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—C. A. Burmeister.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Archer (Wyo.) Field Station:**

*Object.*—Same as preceding project.

*Location.*—About 1 mile from Archer, Wyo.

*Date begun.*—1913.

*Results.*—Work in progress one year; no definite results as yet.

*Assignment.*—L. D. Willey.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Ardmore (S. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Private individuals.

*Location.*—About 2 miles from Ardmore, S. Dak.

*Date begun.*—1911.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—F. L. Kelso, J. T. Sarvis.

*Proposed expenditures, 1914-15.*—\$100,000 (general expenses).

**Belle Fourche (S. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Forest Service and Reclamation Service.

*Location.*—About 2 miles from Newell, S. Dak.

*Date begun.*—1907.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—O. R. Mathews.

*Proposed expenditures, 1914-15.*—\$2,800 (general expenses).

**Colby (Kans.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Kansas State Agricultural College.

*Location.*—About 1 mile from Colby, Kans.

*Date begun.*—July, 1914.

*Assignment.*—J. B. Kuska.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Dalhart (Tex.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Dalhart Fair Association, Dalhart, Tex.

*Location.*—About 3 miles from Dalhart, Tex.

*Date begun.*—1907.

*Results.*—Published in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—W. D. Griggs, C. B. Brown.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).

**Dickinson (N. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—North Dakota Experiment Station.

*Location.*—About 1 mile from Dickinson, N. Dak.

*Date begun.*—1903.

*Results.*—See Department Yearbooks for 1907 and 1911, B. P. I. Bulletins 187, 188, 230, 284, and 285, and Reports of State Experiment Station at Dickinson, N. Dak., for 1908, 1909, 1910, 1911, and 1912.

*Assignment.*—J. C. Thysell.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Edgeley (N. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—North Dakota Experiment Station and Forest Service.

*Location.*—About 1 mile from Edgeley, N. Dak.

*Date begun.*—1905.

*Results.*—Published in Department Yearbooks for 1907 and 1911, B. P. I. Bulletins 187, 188, 230, 284, and 285, and Reports of State Experiment Station at Edgeley, N. Dak., for 1905, 1906, 1907, 1908, 1909, 1910, 1911, and 1912.

*Assignment.*—Ray S. Towle.

*Proposed expenditures, 1914-15.*—\$2,200 (general expenses).

**Garden City (Kans.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Kansas Experiment Station.

*Location.*—About 4 miles from Garden City, Kans.

*Date begun.*—1906.

*Results.*—Published in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—J. G. Lill.

*Proposed expenditures, 1914-15.*—\$2,800 (general expenses).

**Hays (Kans.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Kansas Experiment Station.

*Location.*—About one-half mile from Hays, Kans.

*Date begun.*—1906.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—A. L. Hallsted.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Hettinger (N. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—North Dakota Experiment Station.

*Location.*—About one-half mile from Hettinger, N. Dak.

*Date begun.*—1910.

*Results.*—Same as preceding project.

*Assignment.*—H. C. McKinstry.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Huntley (Mont.) Field Station:**

*Object.*—Same as preceding project.

*Location.*—About one-half mile from Osborn, Mont.

*Date begun.*—1909.

*Results.*—Same as preceding project.

*Assignment.*—G. W. Morgan.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**North Platte (Nebr.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Nebraska Experiment Station.

*Location.*—About 2 miles from North Platte, Nebr.

*Date begun.*—1906.

*Results.*—Published in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285; also Nebraska Experiment Station Reports for 1907, 1909, 1910, 1911, and 1912.

*Assignment.*—W. M. Osborn.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Judith Basin (Mont.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Montana Experiment Station.

*Location.*—About 1 mile from Moccasin, Mont.

*Date begun.*—1907.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285; also Montana Experiment Station Bulletin 74 and Annual Reports for 1907, 1908, 1909, 1910, 1911, and 1912.

*Assignment.*—J. M. Stephens.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Scottsbluff (Nebr.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Reclamation Service, Nebraska Experiment Station, and Forest Service.

*Location.*—About 6 miles from Mitchell, Nebr.

*Date begun.*—1909.

*Results.*—Same as preceding project.

*Assignment.*—J. H. Jacobson.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Tucumcari (N. Mex.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Cooperation with New Mexico Experiment Station planned.

*Location.*—About 2 miles from Tucumcari, N. Mex.

*Date begun.*—1912.

*Results.*—Data in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285.

*Assignment.*—J. E. Mundell and H. G. Smith.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).

**Williston (N. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—North Dakota Experiment Station.

*Location.*—About one-half mile from Williston, N. Dak.

*Date begun.*—1909.

*Results.*—Published in Department Yearbooks for 1907 and 1911 and B. P. I. Bulletins 187, 188, 230, 284, and 285; also Station Reports for 1908, 1909, 1910, 1911, and 1912.

*Assignment.*—Arthur Ogaard.

*Proposed expenditures, 1914-15.*—\$2,200 (general expenses).

**Woodward (Okla.) Field Station:**

*Object.*—Same as preceding project.

*Location.*—About 2 miles from Woodward, Okla.

*Date begun.*—March, 1914.

*Assignment.*—E. C. Chilcott and L. N. Jensen.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses).

**Mandan (N. Dak.) Field Station:**

*Object.*—To assemble, test, develop, propagate, and distribute trees, shrubs, and other plants adapted to the climate and soil of the semiarid lands of the United States, secured in this country and abroad, and to demonstrate the value of these plants.

*Cooperation.*—Cooperation planned with North Dakota Experiment Station.

*Location.*—About 1½ miles from Mandan, N. Dak.

*Date begun.*—1912.

*Results.*—Building operations in progress; farm work being inaugurated.

*Assignment.*—W. A. Peterson and Max Pfander.

*Proposed expenditures, 1914-15.*—\$33,500 (general expenses, \$32,000; statutory, \$1,500).

**Total, Dry-Land Agriculture Investigations, \$164,940** (general expenses, \$160,000;<sup>1</sup> statutory, \$4,940).

**WESTERN IRRIGATION AGRICULTURAL INVESTIGATIONS.****SUPERVISORY AND OFFICE WORK.****Supervisory and Office Work:**

*Object.*—To supervise the maintenance of field stations and direct the agricultural work on irrigated and other lands in the arid and semiarid regions of the West, and conduct routine office business in connection therewith.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—C. S. Scofield, F. D. Farrell, G. A. Wood.

*Proposed expenditures, 1914-15.*—\$15,835 (general expenses, \$9,895; statutory, \$5,940).

**CROP PRODUCTION UNDER IRRIGATION.****San Antonio (Tex.) Field Station:**

*Object.*—To determine new and standard crops and agricultural methods adapted to successful farming in the vicinity of San Antonio, Tex.

*Location.*—Near San Antonio, Tex.

*Date begun.*—1903.

*Results.*—Work at this station is on problems affecting the production of grain sorghums, forage crops, and experiments in subsoiling, which culminated during 1912 in the publication of three papers dealing with these subjects. Much work has been done on the domestication of native trees and shrubs for use as

<sup>1</sup> Including \$30,000 to be used in the establishment of two new stations, one in Texas and one in Oklahoma, location to be determined later.

**San Antonio (Tex.) Field Station—Continued.**

grafting stock or for crossbreeding, and successful crosses between the native plum and the peach and plum have been made, as well as successful grafting of the better types of grapes on the native mustang grape. The horticultural work of the station, to which much attention has been given, is now yielding important results, which are being published, as well as being put into use by local farmers.

*Assignment.*—S. H. Hastings, C. R. Letteer.

*Proposed expenditures, 1914-15.*—\$12,100 (general expenses, \$9,940; statutory, \$2,160).

**Yuma (Ariz.) Field Station:**

*Object.*—To develop agricultural methods under irrigation.

*Location.*—Yuma reclamation project, near Bard, Cal.

*Date begun.*—1906.

*Results.*—A method for securing a perfect stand of alfalfa (the principal crop of the Yuma project) has been determined; also a method of enriching the sandy lands by the use of cowpeas as a green manure. Breeding and extension work with Egyptian cotton has been continued and an association of farmers formed on the project for the commercial production of Durango cotton. Large quantities of date seed have been distributed to settlers, and more than 1,000 seedling figs (crosses between the Smyrna and common varieties) have been planted with a view to securing new varieties having the desirable characteristics of both varieties. After a test of many varieties, it has been found that one type of milo is much more profitable than corn as a grain crop, and the production of this type has been recommended.

*Assignment.*—R. E. Blair, C. E. Patterson.

*Proposed expenditures, 1914-15.*—\$12,070 (general expenses, \$10,630; statutory, \$1,440).

**Truckee-Carson (Nev.) Field Station:**

*Object.*—To determine crop varieties and agricultural methods most suitable to successful agriculture on irrigated lands of the region.

*Location.*—Truckee-Carson reclamation project, near Fallon, Nev.

*Date begun.*—1906.

*Results.*—It has been found that complete reclamation of the low-lying alkali lands of the project involves lowering the ground water table and using special methods of tillage and fertilizing. These methods have been worked out on a small scale and are now being applied on the fields. A large number of varieties of truck and horticultural crops have been tested, both on the experiment farm and on other farms on the project.

*Assignment.*—F. B. Headley, E. W. Curtis.

*Proposed expenditures, 1914-15.*—\$10,115 (general expenses, \$8,495; statutory, \$1,620).

**Huntley (Mont.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Montana Experiment Station and Billings Sugar Co.

*Location.*—Huntley reclamation project, near Huntley, Mont.

*Date begun.*—1908.

*Results.*—The work at this station has been extended to include a series of 70 quarter-acre plats devoted to rotation experiments under irrigation. An experiment in methods and time of planting alfalfa has demonstrated that early planting is preferable to late planting. An experiment in distance of planting and thinning sugar beets has demonstrated the best combination of thinning and planting. Progress has been made with experiments to determine the best method of reducing the salt content of some of the lands of the project, it having been demonstrated that such reduction can be brought about and can be made permanent with proper drainage. It has been shown that the pasturing of hogs on alfalfa is the most profitable way to utilize this crop.

*Assignment.*—Dan Hansen.

*Proposed expenditures, 1914-15.*—\$10,100 (general expenses, \$8,480; statutory \$1,620).

**Belle Fourche (S. Dak.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Forest Service.

*Location.*—Belle Fourche reclamation project, near Newell, S. Dak.

*Date begun.*—1907.

**Belle Fourche (S. Dak.) Field Station—Continued.**

*Results.*—The work at this station has been extended to include a series of 32 rotation experiments under irrigation, including the pasturing of hogs on alfalfa. Tree-planting experiments in cooperation with the Forest Service, begun in 1909, have been continued, and the best varieties for dry-land growth have been determined, in cooperation with three other offices of the Bureau of Plant Industry, who have specialists stationed at the experiment farm.

*Assignment.*—Beyer Aune, J. B. Wentz.

*Proposed expenditures, 1914-15.*—\$9,300 (general expenses, \$8,580; statutory, \$720).

**Scottsbluff (Nebr.) Field Station:**

*Object.*—Same as preceding project.

*Cooperation.*—Forest Service and Nebraska Experiment Station.

*Location.*—North Platte reclamation project, near Mitchell, Nebr.

*Date begun.*—1909.

*Results.*—The work at this farm has been extended to include experiments to determine the relative value of different crop rotations, including a demonstration of the value of using hogs on alfalfa as a method of utilizing that crop. Determinations have been made of the best varieties of various farm crops to grow in the region, and some definite results have been obtained from experiments with orchard and small fruits, ornamentals, and garden vegetables. Much attention has been given to educational work among the farmers on the Project, and in cooperation with the Nebraska Experiment Station some experiments and demonstrations in feeding live stock have been carried on.

*Assignment.*—Fritz Knorr.

*Proposed expenditures, 1914-15.*—\$7,300 (general expenses, \$6,580; statutory, \$720).

**Umatilla (Oreg.) Field Station:**

*Object.*—To determine crops and agricultural methods best adapted to successful farming on the sandy soils of the Umatilla reclamation project.

*Cooperation.*—Forest Service and Oregon Experiment Station.

*Location.*—Umatilla reclamation project, near Hermiston, Oreg.

*Date begun.*—1909.

*Results.*—The work of this farm is mainly horticultural and is confined chiefly to testing varieties of orchard fruits, small fruits, and truck crops. Some very encouraging results have been obtained from experiments with various cover crops, fertilizer tests, and leguminous crops with a view to increasing the productivity of the sandy lands of the project.

*Assignment.*—R. W. Allen.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses, \$2,280; statutory, \$720).

**Total, Crop Production under Irrigation, \$63,985** (general expenses, \$54,985; statutory, \$9,000).

**SOUTHWESTERN COTTON CULTURE.****Introduction of Commercial Cotton Culture in the Southwest:**

*Object.*—To introduce into commercial culture in the arid Southwest profitable strains of long-staple cottons bred and acclimatized to meet local conditions.

*Location.*—Southern Arizona and southeastern California.

*Date begun.*—1906.

*Results.*—During 1912, 550 acres of land were planted to improved types of Egyptian cotton and about 200 acres to Durango cotton. During 1913 the acreage was about 3,500 of Egyptian cotton, located in Salt River Valley, and about 6,000 acres of Durango cotton in the Imperial Valley of California. The results of 1913 were so satisfactory that in 1914 there were planted 13,000 acres of Egyptian cotton in the Salt River Valley, and 15,000 acres of Durango cotton in the Imperial Valley. Associations of farmers have been formed under the guidance of the department for the purpose of marketing the cotton crop and for providing an adequate supply of selected seed for planting. The crop of 1913 was marketed to advantage in spite of rather limited demand and lower prices for long-staple cotton.

*Assignment.*—Argyle McLachlan.

*Proposed expenditures, 1914-15.*—\$5,500 (general expenses, \$5,500).

**Total, Western Irrigation Agriculture Investigations, \$85,320** (general expenses, \$70,380; statutory, \$14,940).

## POMOLOGICAL INVESTIGATIONS.

## OFFICE AND LABORATORY.

**Office and Laboratory:**

*Object.*—General administration, including correspondence, maintenance of miscellaneous files and indexes, handling of vouchers, requisitions, inventory, and pay rolls, incident to the work.

*Location.*—Washington, D. C.

*Date begun.*—1886.

*Assignment.*—A. V. Stubenrauch, H. P. Gould, and A. C. Shepherd.

*Proposed expenditures, 1914-15.*—\$16,130 (general expenses, \$8,590; statutory, \$7,540).

## FRUIT TRANSPORTATION, STORAGE, AND UTILIZATION INVESTIGATIONS.

**Fruit Transportation and Storage Investigations:**

*Object.*—To determine factors that govern the successful transportation and storage of fruits.

*Cooperation.*—Fruit growers' associations and exchanges, individual growers, independent shippers, railway companies, refrigerator-car lines, cold-storage warehouses, and fruit receivers.

*Location.*—Field work in Georgia, Florida, California, Oregon, and Washington; storage experiments at New York, Jersey City, Pittsburgh, Buffalo, Chicago, Washington, D. C., and Portland, Ore.

*Date begun.*—1901.

*Results.*—Determination of the factors underlying the successful handling and shipment of fruits, especially oranges, lemons, grapes, and berries in California; oranges, grapefruit, and pineapples in Florida; apples, pears, and berries in Oregon and Washington; peaches in Georgia; apples in Atlantic and Middle Western States. Data published in Bureau of Plant Industry Bulletins 40, 48, 108, and 123, Department Bulletins 35 and 63, Yearbook articles, bureau circulars and documents, and miscellaneous papers and addresses.

*Assignment.*—H. J. Ramsey, S. J. Dennis, C. W. Mann, A. W. McKay, K. B. Lewis, E. L. Markell, E. L. Mosher.

*Proposed expenditures, 1914-15.*—\$40,400 (general expenses, \$37,500; statutory, \$2,900).

**Fruit Utilization Investigations:**

*Object.*—Determination of the best methods for handling and utilizing surplus and cull American fruits, with special reference to the manufacture of fruit juices and processing of Japanese persimmons.

*Cooperation.*—Fruit growers' associations, storage warehouses, transportation lines, and Bureau of Chemistry.

*Location.*—Laboratory work at Washington, D. C.; field work in Florida, Virginia, Maine, Oregon, and Washington.

*Date begun.*—1900.

*Results.*—Progress made in the concentration of fruit juices by freezing, ripening of bananas, processing of Japanese persimmons, and studies in fruit drying. Results published in Bureau of Chemistry Bulletins 94, 97, 118, 141, 142, and 155, and various B. P. I. circulars and articles.

*Assignment.*—A. V. Stubenrauch, H. C. Gore.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Total, Fruit Transportation, Storage, and Utilization Investigations,** \$42,400 (general expenses, \$39,500; statutory, \$2,900).

## VITICULTURAL INVESTIGATIONS.

**Grape Investigations in Vinifera Regions:**

*Object.*—To determine congeniality of grape varieties to various resistant stocks; adaptability of resistant grape stocks to soil types and climatic conditions; adaptability of Vinifera grape varieties to soil types, and climatic and other conditions.

*Cooperation.*—Private individuals.

*Location.*—California.

*Date begun.*—1899.

**Grape Investigations in Vinifera Regions—Continued.**

*Results.*—Researches in experiment vineyards are yielding valuable results. Data in Yearbook article, 1902, B. P. I. Bulletin 172, addresses delivered and articles prepared by viticulturists, and annual reports of Chief of Bureau of Plant Industry from 1902 to 1912; bulletins in course of preparation.

*Assignment.*—George C. Husmann, Fred L. Husmann, Richard Schmidt.

*Proposed expenditures, 1914-15.*—\$11,650 (general expenses, \$11,050; statutory, \$600).

**Grape Investigations in Muscadine Regions:**

*Object.*—To develop the Muscadine grape industry in the South Atlantic and Gulf States, discover and disseminate other choice varieties, and originate new varieties specially adapted to particular districts.

*Cooperation.*—North Carolina State Board of Agriculture and private individuals.

*Location.*—South Atlantic and Gulf States.

*Date begun.*—1905.

*Results.*—Muscadine experiment vineyard established; special pruning experiments prosecuted in commercial vineyards of Florida and North Carolina; field surveys made; collection of new varieties for testing obtained; data in B. P. I. Bulletin 273 and Reports of Chief of Bureau of Plant Industry, 1905 to 1912.

*Assignment.*—Geo. C. Husmann, Chas. Dearing.

*Proposed expenditures, 1914-15.*—\$2,965 (general expenses, \$2,765; statutory, \$200).

**Grape Investigations in American Native-Grape Regions:**

*Object.*—To reestablish grape culture in the middle Atlantic States and develop the unfermented grape-juice industry in the United States, determine the adaptability of the American native grape varieties to soil, climatic, and other conditions, and conduct miscellaneous viticultural investigations.

*Cooperation.*—Private individuals.

*Location.*—Throughout the United States.

*Date begun.*—1902.

*Results.*—Run-down vines have been renovated and restored to profitable bearing condition; data in 1904 Yearbook article, B. P. I. Bulletin 24, Farmers' Bulletins 175 and 471, and other publications; a new publication in preparation.

*Assignment.*—Geo. C. Husmann, Fred L. Husmann, Chas. Dearing, Richard Schmidt.

*Proposed expenditures, 1914-15.*—\$2,965 (general expenses, \$2,765; statutory, \$200).

**Total, Viticultural Investigations,** \$17,580 (general expenses, \$16,580; statutory, \$1,000).

**FRUIT-PRODUCTION INVESTIGATIONS.****Adaptability of Fruit Varieties to Environment:**

*Object.*—To obtain information regarding fruit growing possibilities throughout the country and the kinds and varieties of fruit best suited for growing in different sections or regions for particular purposes.

*Location.*—Kentucky, West Virginia, and Tennessee, and in general throughout the country.

*Date begun.*—1901.

*Results.*—Data in B. P. I. Bulletins 135, 194, and 275 and B. P. I. Circular 51; publication in preparation.

*Assignment.*—H. P. Gould, W. F. Fletcher, Geo. M. Darrow.

*Proposed expenditures, 1914-15.*—\$5,900 (general expenses, \$5,500; statutory, \$400).

**Fruit Culture Investigations:**

*Object.*—To secure information regarding the methods of practice in growing fruits in different parts of the country. The work involves systematic study of fruit growing practices, including propagation, planting, tillage, irrigation, fertilization, cover crops, interplanted crops, pruning, and such other operations as may be practiced in growing fruits.

*Location.*—Washington, D. C., and all fruit-producing districts of the United States.

*Date begun.*—1914. (Work in progress in connection with other projects for a number of years.)

*Results.*—The assembling of considerable data on fruit cultural methods in vogue in different regions of the United States.

*Assignment.*—H. P. Gould, Geo. M. Darrow.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses, \$4,700; statutory, \$300).

**Phenological Investigations:**

*Object.*—To determine the actual and relative dates of the occurrence of the seasonal epochs of varieties of fruits and fruit trees.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Data in B. P. I. Bulletins 135, 194, and 275; bulletins in course of preparation.

*Assignment.*—H. P. Gould, W. F. Fletcher, Emma C. Herrick.

*Proposed expenditures, 1914-15.*—\$1,400 (general expenses, \$200; statutory, \$1,200).

**Dry-Land Ranch Fruit Gardens:**

*Object.*—To work out the best methods of culture for the growing of the different kinds of fruits in semiarid regions of the West and determination of varieties best suited to the conditions for furnishing a home supply.

*Location.*—Akron, Colo., and Amarillo, Tex.

*Date begun.*—1908.

*Results.*—At Akron, two or three varieties of sour cherries have fruited for two or more seasons; varieties of native plums, varieties of apples, sand cherries and other sorts of cherries, currants, and gooseberries show promise; results with raspberries and blackberries unsatisfactory. At Amarillo, the work is more recent; trees have made satisfactory growth, showing possibilities of producing apples, plums, and cherries.

*Assignment.*—H. P. Gould, Oliver J. Grace, John F. Ross.

*Proposed expenditures, 1914-15.*—\$850 (general expenses, \$750; statutory, \$100).

**Forest Ranger Fruit and Ornamental Gardens:**

*Object.*—To provide a supply of fruit and ornamental plants for the use of forest rangers, and incidentally to obtain data on the adaptability of fruit varieties and ornamental shrubs and plants to many sections where such plants are not now cultivated or are grown under very adverse conditions.

*Cooperation.*—Forest Service.

*Location.*—Kansas, Arkansas, and Rocky Mountain districts.

*Date begun.*—1909.

*Results.*—3,400 apple trees have been distributed and planted.

*Assignment.*—H. P. Gould, S. T. Dana, F. L. Mulford.

*Proposed expenditures, 1914-15.*—\$500 (general expenses, \$400; statutory, \$100).

**Utilization of Fruit on the Farm:**

*Object.*—To secure information relative to the best and most practical methods of using the lower grades of fruits and surplus stock which can not be marketed profitably in a fresh state.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Data in Farmers' Bulletins 291 and 426.

*Assignment.*—H. P. Gould, W. F. Fletcher, George M. Darrow.

*Proposed expenditures, 1914-15.*—No allotment; work incidental to other investigations.

**Total, Fruit-Production Investigations, \$13,650** (general expenses, \$11,550; statutory, \$2,100).

**NUT-CULTURE INVESTIGATIONS.****Pecan Investigations:**

*Object.*—To determine the relative merit and cultural adaptability of pecan varieties to cultivation, with special reference to the conditions existing in the South Atlantic and Gulf States.

*Cooperation.*—National Nut Growers' Association, Northern Nut Growers' Association, and independent growers.

*Location.*—South Atlantic and Gulf States.

*Date begun.*—1902.

*Results.*—Data in Yearbooks appearing since 1904, B. P. I. Bulletin 251, B. P. I. Circular 112, and reports and addresses before the National Nut Growers' Association; publications in preparation.

*Assignment.*—A. V. Stubenrauch, C. A. Reed.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses, \$2,500; statutory, \$1,000).

**Persian Walnut Investigations:**

*Object.*—Introduction of foreign varieties, breeding new varieties, and studies relative to the propagation and culture of the crop, and the adaptability, market requirements, and food value of varieties.

*Cooperation.*—Private growers.

*Location.*—Washington, D. C.; Arlington, Va., and nut-growing territory.

*Date begun.*—1910.

*Results.*—Data in B. P. I. Bulletin 254; varietal tests and breeding work under way at Arlington Farm.

*Assignment.*—E. R. Lake, C. A. Reed.

*Proposed expenditures, 1914-15.*—\$2,100 (general expenses, \$2,000; statutory, \$100).

**Miscellaneous Nut-Culture Investigations:**

*Object.*—The investigation of cultural problems pertaining to nuts of commercial importance not included in other projects.

*Cooperation.*—Growers and dealers in domestic and foreign nuts.

*Location.*—Special nut districts of the United States; nut markets.

*Date begun.*—1910.

*Results.*—Publications issued, addresses delivered, and data accumulated.

*Assignment.*—A. V. Stubenrauch, C. A. Reed.

*Proposed expenditures, 1914-15.*—\$540 (general expenses, \$440; statutory, \$100).

**Improvement of the Hickory Nut:**

*Object.*—To obtain nuts of larger size, thinner shell, and better quality.

*Cooperation.*—Volunteer growers.

*Location.*—Washington, D. C., and Arlington, Va.

*Results.*—Choice nut trees located and seeds planted on Arlington Farm.

*Assignment.*—C. A. Reed.

*Proposed expenditures, 1914-15.*—No allotment; work incidental to other investigations.

**Total, Nut-Culture Investigations,** \$6,140 (general expenses, \$4,940; statutory, \$1,200).

**POMOLOGICAL BREEDING INVESTIGATIONS.****Citrus-Fruit Improvement Through Bud Selection:**

*Object.*—The improvement of citrus fruits, especially oranges, lemons, and pomelos, by selection and breeding.

*Cooperation.*—Commercial citrus growers.

*Location.*—Riverside, Cal.

*Date begun.*—1910.

*Results.*—Data of yield of individual citrus trees secured; parent trees selected and a considerable number of nursery trees propagated from them.

*Assignment.*—A. D. Shamel, L. B. Scott, C. S. Pomeroy.

*Proposed expenditures, 1914-15.*—\$8,840 (general expenses, \$8,540; statutory, \$300).

**Deciduous-Fruit Improvement Through Bud Selection:**

*Object.*—To investigate methods for determining reliable and valuable parent trees and other plants from which to propagate uniform and improved strains.

*Cooperation.*—Commercial growers.

*Location.*—Connecticut.

*Date begun.*—1910.

*Results.*—Largely prospective; information necessary for further prosecution of work secured.

*Assignment.*—A. D. Shamel, L. B. Scott, C. S. Pomeroy.

*Proposed expenditures, 1914-15.*—\$2,605 (general expenses, \$2,505; statutory, \$100).

**Rosaceous-Fruit Breeding Investigations:**

*Object.*—A study of the fundamental principles involved in the breeding of new and improved varieties of rosaceous fruits and the production of varieties of improved intrinsic quality, hardiness, productiveness, and disease resistance in the different fruit-producing regions of the country.

*Cooperation.*—Texas and Iowa Experiment Stations, Iowa State Horticultural Society, and private individuals.

*Location.*—Arlington, Va., Texas, and Iowa.

*Date begun.*—1913.

*Results.*—Pollination of a large number of varieties of peaches and plums in Texas, and of apples, plums, and pears in Iowa.

*Assignment.*—W. F. Wight.

*Proposed expenditures, 1914-15.*—\$2,455 (general expenses).

**Mississippi Valley Hardy-Fruit Breeding:**

*Object.*—The breeding of hardy fruits adapted to climatic and soil conditions in the upper Mississippi and Missouri Valleys.

*Cooperation.*—Iowa Agricultural Experiment Station and Iowa State Horticultural Society.

*Location.*—Ames, Iowa.

*Date begun.*—1909.

*Results.*—About 20 acres of closely planted trees of definite parentage under culture.

*Assignment.*—Chas. G. Patten, C. L. Watrous, S. A. Beach, W. F. Wight.

*Proposed expenditures, 1914-15.*—\$1,530 (general expenses).

**Improvement of Summer Apples Through Breeding:**

*Object.*—The breeding of the earliest summer varieties of apples, with a view to securing earlier ripening varieties, especially red ones.

*Cooperation.*—Maryland Agricultural Experiment Station.

*Location.*—College Park, Md.

*Date begun.*—1905.

*Results.*—Several hundred seedling trees of definite breeding now growing at the Maryland Agricultural Experiment Station, some of which have been fruiting for two years; 3,158 viable seeds obtained in 1912 and 1913.

*Assignment.*—C. P. Close.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Total, Pomological Breeding Investigations,** \$15,930 (general expenses, \$15,530; statutory, \$400).

**FRUIT NOMENCLATURE INVESTIGATIONS.****Systematization and Simplification of Fruit Nomenclature:**

*Object.*—To secure a simple, pure, and stable nomenclature of the cultivated American fruits.

*Cooperation.*—American Pomological Society and various State horticultural and pomological societies.

*Location.*—Washington, D. C., and Arlington, Va.

*Date begun.*—1901.

*Results.*—Publications issued and in preparation.

*Assignment.*—E. R. Lake.

*Proposed expenditures, 1914-15.*—\$2,515 (general expenses).

**FRUIT IDENTIFICATION INVESTIGATIONS.****Identification and Standardization of Fruits:**

*Object.*—To secure information on and name varieties of fruits; to prepare illustrations and descriptions of varieties.

*Location.*—Washington, D. C.

*Date begun.*—About 1890.

*Results.*—About 4,000 identifications made yearly; material collected.

*Assignment.*—C. P. Close.

*Proposed expenditures, 1914-15.*—\$9,460 (general expenses, \$4,820; statutory \$4,640).

**MISCELLANEOUS POMOLOGICAL INVESTIGATIONS.****Fruit-Tree Stocks:**

*Object.*—To determine fruit-tree stocks best adapted to the important soil types; double working to insure root and trunk endurance of adverse conditions.

*Location.*—Arlington, Va.

*Date begun.*—1910.

*Results.*—Entirely prospective.

*Assignment.*—W. F. Wight.

*Proposed expenditures, 1914-15.*—Negligible; work conducted incidental to other projects.

**Persimmon Investigations:**

*Object.*—(a) To determine the cultural range of both native and Japanese species, adaptability and cultural range, methods of culture, propagation, etc.; (b) to develop improved varieties, both as to productiveness and hardness of tree and quality of fruit, by selection and hybridization.

*Cooperation.*—State experiment stations and private parties.

*Location.*—Arlington, Va., and other points.

**Persimmon Investigations—Continued.***Date begun.*—1910.*Results.*—Trees yielding fruit of superior quality located, propagated, and distributed, and the culinary and food value of the fruit studied.*Assignment.*—H. P. Gould, W. F. Fletcher.*Proposed expenditures, 1914-15.*—No allotment; work incidental to other projects.**Oregon Wild Prunes and Their Utilization in Agriculture:***Object.*—To investigate the varieties of the Oregon wild prunes; secure young trees, scions, and seeds of best varieties; place material in hands of horticulturists and plant breeders; and develop varieties of prunes and plums better adapted to cold and dry conditions in the northwestern United States.*Cooperation.*—Plant breeders and others interested.*Location.*—Southern Oregon and northwestern California.*Date begun.*—1908.*Results.*—Preliminary work in 1909; inactive since.*Assignment.*—Frederick V. Coville.*Proposed expenditures, 1914-15.*—No allotment; work incidental to other projects.**Domestication and Utilization of the Buffalo Berry:***Object.*—To develop fruit and ornamental possibilities of the buffalo berry.*Location.*—Buffalo berry districts in the western portion of the United States.*Date begun.*—1912.*Results.*—Prospective.*Assignment.*—David Griffiths.*Proposed expenditures, 1914-15.*—No allotment; incidental to other investigations.**Search for Blight-Proof Pear:***Object.*—To find and assemble for experiments trees resistant to blight.*Location.*—Washington, D. C., Arlington, Va., and Lee and Scott Counties, Iowa.*Date begun.*—1910.*Results.*—Immune trees located, scions obtained and root-grafts made, and hybridization with Seckel and Anjou varieties effected.*Assignment.*—G. B. Brackett.*Proposed expenditures, 1914-15.*—No allotment; incidental to other investigations.**FRUIT HISTORY INVESTIGATIONS.****Fruit History Investigations:***Object.*—The accumulation of data relating to the history of varieties of fruit, with special reference to old and little-known varieties and classes of fruits; the assembling of information relating to the origin of varieties, as well as pertaining to the cultural range and extent of planting in the past.*Location.*—Washington, D. C.*Date begun.*—1913.*Results.*—A mass of data has been assembled, systematized, indexed, and filed.*Assignment.*—G. B. Brackett.*Proposed expenditures, 1914-15.*—\$5,075 (general expenses, \$3,475; statutory, \$1,600).**Total, Pomological Investigations, \$128,880** (general expenses, \$107,500; statutory, \$21,380).**EXPERIMENTAL GARDENS AND GROUNDS.****General Care of Greenhouses and Grounds:***Object.*—To maintain a range of 27 greenhouses for general hybridization and plant-breeding work, seed testing, experimental work with collections of citrus and other tropical fruits; propagation of plants for ornamenting the grounds of the department and those of the Weather Bureau, for miscellaneous experimental work, and for special congressional distribution; experimental work with vegetables and with florists' crops, including roses, carnations, and chrysanthemums.*Location.*—Washington, D. C.*Date begun.*—1862.*Assignment.*—E. M. Byrnes.*Proposed expenditures, 1914-15.*—\$51,890 (general expenses, \$11,690; statutory, \$40,200).

## HORTICULTURAL INVESTIGATIONS.

### OFFICE AND LABORATORIES.

#### Office and Laboratory:

*Object.*—To provide for the administration and direction of scientific lines of research, including clerical work.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—A. V. Stubenrauch.

*Proposed expenditures, 1914-15.*—\$18,960 (general expenses, \$11,910; statutory, \$7,050).

### TRUCK-CROP INVESTIGATIONS.

#### Sweet-Potato Investigations:

*Object.*—To determine cultural methods, including planting, cultivation, harvesting, storage, and marketing, and determination of varietal characteristics and synonymy of the sweet potato.

*Cooperation.*—Practical growers.

*Location.*—New Jersey, Maryland, Virginia, Alabama, and Mississippi.

*Date begun.*—1900.

*Results.*—Satisfactory results on storing problems in Southern States and use of desiccated sweet potatoes as cattle food; publication in preparation.

*Assignment.*—H. C. Thompson, H. M. Conolly.

*Proposed expenditures, 1914-15.*—\$3,825 (general expenses).

#### Celery Investigations:

*Object.*—To study methods of growing celery, and investigate difficulties in connection with drainage, fertilizers, harvesting, transportation, and storage.

*Location.*—New York, New Jersey, Florida, Southern California.

*Date begun.*—1912.

*Results.*—Data in Farmers' Bulletin 282; development of types of packages for shipping and storage; development of types of storage houses.

*Assignment.*—H. C. Thompson.

*Proposed expenditures, 1914-15.*—\$2,600 (general expenses, \$2,210; statutory, \$390).

#### Peanut Investigations:

*Object.*—To improve commercial varieties of peanuts; to demonstrate to farmers cultural methods, use of fertilizers, crop rotations, and methods of harvesting, thrashing, etc.; to improve the production and extend the use of the peanut through cleaners and manufacturers and to demonstrate the use of the peanut as a forage crop, especially in connection with pork production in South Atlantic States.

*Cooperation.*—Louisiana and Mississippi Experiment Stations, local farmers, oil mills, cleaners, handlers, and peanut-butter manufacturers at Suffolk and Norfolk, Va., and Canajoharie, N. Y.

*Location.*—Virginia, Louisiana, Mississippi, and New York.

*Date begun.*—1905.

*Results.*—Great extension of peanut industry through cotton boll-weevil districts; data in B. P. I. circulars and Farmers' Bulletins.

*Assignment.*—H. C. Thompson.

*Proposed expenditures, 1914-15.*—\$2,250 (general expenses).

#### Investigations of the Adaptation of Truck Crops to Organic Soils (Mucks and Peats):

*Object.*—To determine truck crops adapted to organic soils, study methods of treatment of different classes, and correlate the results of such investigations.

*Cooperation.*—American Peat Society and Bureau of Mines.

*Location.*—New Jersey and Arlington, Va.

*Date begun.*—1912.

*Results.*—Greenhouse experiments show value of muck soil for basis of soil mixtures for forcing lettuce, cauliflower, tomatoes, roses, and carnations; work under way in the handling of muck fields under outdoor culture.

*Assignment.*—H. C. Thompson.

*Proposed expenditures, 1914-15.*—\$3,710 (general expenses, \$2,420; statutory, \$1,290).

### Standardizing Commercial Varieties of Vegetables and Investigation of Commercial Production of Flower and Garden Seeds:

*Object.*—To develop special strains of standard sorts of vegetables for particular regions and purposes; encourage truck growers to grow such seed; obtain information regarding methods of production of commercial vegetable seed to improve strains and methods of culture; publish the fundamental principles of seed growing; straighten out variety nomenclature of vegetables.

*Location.*—Arlington, Va.

*Date begun.*—1898.

*Results.*—Data in B. P. I. Bulletins 21, 69, 109, and 184; standard strains of lettuce, tomatoes, and cauliflower established; note blanks for recording field trials with vegetables perfected and in use by experiment station investigators, seedsmen, and instructors; samples of seeds for congressional distribution grown, also special vegetables and novelties introduced by the trade; work with beets, spinach, cabbage, peas, beans, tomatoes, and sweet corn for table and canning purposes under way.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—\$10,520 (general expenses, \$2,900; statutory, \$780; purchase and distribution of valuable seeds, \$6,840).

### Truck-Crop Fertilizer Investigations:

*Object.*—To determine injurious effects of continued heavy applications of commercial fertilizers and means of counteracting same, influence of continued applications of mineral fertilizers on physical and bacteriological conditions of soil, and relative value of plant foods from various sources.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Virginia.

*Date begun.*—1907.

*Results.*—Experiments with potatoes have shown that liming favors scabiness, that phosphoric acid increases production, and that sulphate of potash is more beneficial than muriate of potash as a fertilizer.

*Probable date of completion.*—1918.

*Assignment.*—H. C. Thompson, Karl F. Kellerman, T. C. Johnson.

*Proposed expenditures, 1914-15.*—\$980 (general expenses).

### Tomato Investigations:

*Object.*—To obtain varieties of tomatoes especially adapted to the use of canners and catsup makers and to establish strains of tomatoes especially adapted for forcing.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Arlington, Va.

*Date begun.*—1907.

*Results.*—Progress in the establishment of varieties suitable to canners' and catsup makers' use; sufficient seed of forcing tomatoes available to introduce among commercial growers.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—\$800 (general expenses).

### Sweet-Corn Investigations:

*Object.*—To develop an extra-early white type of Malakhof corn and pure strains of Country Gentleman, Early Minnesota, and Evergreen corns, and determine their value for canning.

*Cooperation.*—Bureau of Chemistry.

*Location.*—Connecticut, Virginia, and Iowa.

*Date begun.*—1906.

*Results.*—Field corn in field contiguous to sweet corn renders corn unfit for canning purposes; 5-year test of soil and climate on sweet corn completed; data in Chemistry Bulletin 127.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—\$100 (general expenses).

### Asparagus Investigations:

*Object.*—To investigate methods of asparagus culture, determine the practices followed in the production of both white and green grass, investigate fertilizer requirements of asparagus in the Long Island region, and secure by selection new and improved varieties of asparagus.

*Cooperation.*—Practical growers (fertilizer investigations).

*Location.*—Long Island, N. Y.

*Date begun.*—1908.

**Asparagus Investigations—Continued.**

*Results.*—Survey work completed; fertilizer trials being continued; records kept of fertilizers applied and cut crop returned from the different plats.

*Probable date of completion.*—1916.

*Assignment.*—H. C. Thompson.

*Proposed expenditures, 1914-15.*—\$100 (general expenses).

**Cucumber Investigations:**

*Object.*—To establish strains of productive slicing cucumbers free from white markings.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Norfolk, Va.

*Date begun.*—1908.

*Results.*—Only preliminary work done so far.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—No allotment; work incidental to other projects.

**Cabbage Investigations:**

*Object.*—To develop pure strains of cabbage seed and insure uniformity in type and character of product, and to increase percentage of merchantable heads.

*Cooperation.*—Virginia Truck Experiment Station and private individuals.

*Location.*—Field studies in New York, Virginia, Wisconsin, and Colorado; storage investigations in New York; seed breeding investigations at Arlington, Va.

*Date begun.*—1908.

*Results.*—Breeding work in progress; data in B. P. I. Circular 39 and Farmers' Bulletin 433.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—\$50 (general expenses).

**Pea Investigations:**

*Object.*—To develop strains of peas producing large percentage of small peas suitable for canners' use; to develop varieties and methods giving a green instead of brown or yellow processed product.

*Location.*—Arlington, Va.

*Date begun.*—1908.

*Results.*—The work has not been pushed for lack of funds and field conditions.

*Assignment.*—W. W. Tracy, sr., D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—Negligible; incidental to other investigations.

**Bean Investigations:**

*Object.*—To build up more productive strains of field and garden beans; develop methods of growing seed beans free from anthracnose.

*Location.*—Arlington, Va., and New York, N. Y.

*Date begun.*—1910.

*Results.*—Large number of selected strains of known history under observation.

*Assignment.*—D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—\$350 (general expenses).

**Onion Investigations:**

*Object.*—To investigate the possibility of growing Denia onions and Denia onion seed in United States.

*Cooperation.*—Practical growers.

*Location.*—Texas, Louisiana, New Mexico, Washington, D. C., northwestern Ohio, and other points in the North.

*Date begun.*—1906.

*Results.*—Preliminary study of production of Denia onions and Denia onion seed; data in Farmers' Bulletins 354 and 434.

*Assignment.*—H. C. Thompson.

*Proposed expenditures, 1914-15.*—\$550 (general expenses).

**Muskmelon and Watermelon Investigations:**

*Object.*—To ascertain the commercial and economic status of the industry; to determine difficulties of producer and handler of the crops; and to investigate cultural requirements, adaptation and improvement of varieties, methods of picking, handling, and marketing crop, with special attention to so-called Montreal Market Muskmelon.

*Cooperation.*—Bureau of Chemistry; Vermont Experiment Station.

*Location.*—Vermont, Decker, Ind., Swedesboro, N. J., Garden City, Kans., Rocky Ford, Colo., Yuma, Ariz., and Gainesville, Fla.

*Date begun.*—1908.

**Muskmelon and Watermelon Investigations—Continued.**

*Results.*—Valuable results indicated in connection with influence of climate; relative value of different strains for long-distance transportation determined.

*Assignment.*—D. N. Shoemaker, W. W. Tracy, sr.

*Proposed expenditures, 1914-15.*—\$75 (general expenses).

**Horse-Radish and Water-Cress Investigations:**

*Object.*—To determine the commercial status of these crops and determine practice connected with their cultivation for the purpose of improving the industry.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Preliminary studies through correspondence and field observations have been made.

*Assignment.*—D. N. Shoemaker.

*Proposed expenditures, 1914-15.*—Negligible; incidental to other investigations.

**Truck-Crop Survey:**

*Object.*—To determine areas suited to economic production of truck crops; determine market demands and maximum profitable average of each crop; map and describe truck-crop areas; establish list of truck crops adapted to area, with annual estimate of acreage safe to plant in each region.

*Location.*—Trucking regions of the United States.

*Date begun.*—1905.

*Results.*—Truck-crop areas mapped; dates of planting, harvesting, methods of harvesting, packing, and marketing truck crops considered, including storage of sweet potatoes, cabbage, onions, Irish potatoes, and celery, and transportation, of perishable crops from district centers of production.

*Assignment.*—A. V. Stubenrauch.

*Proposed expenditures, 1914-15.*—Nominal; incidental to other projects.

**Raising New Varieties of Lettuce by Hybridization:**

*Object.*—To secure improved forcing and outdoor varieties of lettuce with special reference to disease resistance, increased size, color, tenderness, and length of time required to mature.

*Location.*—Washington, D. C., and Miami, Fla.

*Date begun.*—1903.

*Results.*—Nearly 100 distinct new varieties have been raised. "Cos" varieties have been united with "Cabbage" varieties and vice versa; a number of these indicate superiority to the most popular varieties now grown by market gardeners and others.

*Assignment.*—G. W. Oliver.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Total, Truck-Crop Investigations,** \$26,110 (general expenses, \$16,810; purchase and distribution of valuable seeds, \$6,840; statutory, \$2,460).

**POTATO INVESTIGATIONS.****Potato Investigations:**

*Object.*—To determine the influence of soil and climate on the quality and productiveness of potatoes; determine conditions necessary for production of tubers of special merit for baking and boiling purposes; select and develop strains of potatoes particularly suitable to special soil and climatic conditions and for the purpose of increasing the yield per acre by eliminating unproductive hills; determine the best source of seed potatoes; study influence of storage conditions on vitality, rate of germination, and crop yields; study cultural practices to improve potato culture; produce new varieties of better quality, greater disease resistance, and greater productiveness; import foreign wild and cultivated sorts to improve cultivated varieties; conduct nutrition investigations to determine food requirements of potato plant; conduct investigations to determine conditions which influence tuber development; maintain a variety collection to improve existing strains by hill selections and tuber-unit methods; and determine relative value of different methods of treating, handling, and cutting seed potatoes.

*Cooperation.*—Virginia Truck Experiment Station; Vermont, Maine, Idaho, and California experiment stations; and Delta Association of California.

*Location.*—Arlington and Norfolk, Va.; Honeoye Falls, N. Y., Houlton, Me., Jerome, Idaho, Middle River, Cal., Highland, N. C.; points in Wisconsin and Minnesota; and field stations of the Office of Dry-Land Agriculture Investigations.

**Potato Investigations—Continued.***Date begun.*—1902.*Results.*—Elimination of unproductive hills, type of variety maintained, and aggregate yield decidedly increased through tuber-unit and hill selection; 60,000 seedlings under observation; general improvement of potato industry.*Assignment.*—Wm. Stuart, W. V. Shear, G. W. Dewey, P. M. Lombard, George Corder.*Proposed expenditures, 1914-15.*—\$22,920 (general expenses, \$22,260; statutory, \$660).**LANDSCAPE GARDENING, FLORICULTURE, AND MISCELLANEOUS HORTICULTURAL INVESTIGATIONS.****Investigation of the Arrangement, Effects, and Use of Trees, Shrubs, and Plants on Streets, Parks, and Lawns:***Object.*—To study the adaptation and longevity of various species of trees under street, lawn, and park conditions; maintain at Arlington farm a collection of the hardy trees and shrubs adapted to this climate, so arranged as to demonstrate their decorative or economic values; to furnish plans for adorning or beautifying grounds of institutions offering instruction in agriculture; investigate methods and materials of lawn making and maintenance.*Cooperation.*—Other bureaus of the department and various departments of the Government; institutions offering instruction in agriculture.*Location.*—Arlington, Va., and other points throughout the United States.*Date begun.*—1911.*Results.*—Planting plans prepared for various departments and institutions.*Assignment.*—F. L. Mulford.*Proposed expenditures, 1914-15.*—\$4,650 (general expenses, \$3,150; statutory, \$1,500).**Floriculture and Forcing-House Investigations:***Object.*—(a) To determine the most favorable conditions for floricultural crops; to study the relative value of blind and flowering wood, floriferous and non-floriferous plants; study the comparative value of first-generation hybrid plants with those propagated in ordinary ways; study methods of securing uniform progeny from first-generation hybrids as to form and color; determine relative value of new varieties of roses, carnations, and other floricultural crops; develop new and improved varieties of roses, carnations, and other greenhouse and garden crops. (b) To determine the best methods of greenhouse construction; determine the relative importance of soil, light, heat, and moisture on growth of crops forced under glass; determine relative value of different methods of greenhouse heating.*Location.*—Arlington, Va.*Date begun.*—1901.*Results.*—Progress along all lines.*Assignment.*—Wm. Stuart and F. L. Mulford.*Proposed expenditures, 1914-15.*—\$3,660 (general expenses, \$1,100; statutory, \$2,560).**Investigation of Methods of Plant Propagation:***Object.*—To investigate the efficiency of various new as well as commonly practiced systems of plant propagation for the purpose of determining their comparative efficiency for commercial as well as experimental use.*Location.*—Arlington, Va.*Date begun.*—1907.*Results.*—Records of observation made.*Assignment.*—G. W. Oliver and August Mayer.*Proposed expenditures, 1914-15.*—\$1,090 (general expenses, \$690; statutory, \$400).**Growing Bermuda Lilies from Seed:***Object.*—To produce disease-free bulbs from seed instead of scales.*Location.*—California, Washington, Florida, and Texas.*Date begun.*—1902.*Results.*—Bulbs grown and flowered in eight months from seed; California appears to produce desirable bulbs; data in B. P. I. Bulletin 39.*Assignment.*—G. W. Oliver.*Proposed expenditures, 1914-15.*—\$400 (general expenses).

**Bulb Growing in the United States:**

*Object.*—To introduce into the United States on a commercial basis the cultivation of bulbs, especially Dutch bulbs; to secure bulbs for congressional distribution.

*Location.*—Bellingham, Wash.

*Date begun.*—1903.

*Results.*—Tulips and narcissuses successfully and economically produced in Puget Sound region; hyacinths successfully produced but economic production questionable.

*Assignment.*—P. H. Dorsett, Peter Bisset, and A. V. Stubenrauch.

*Proposed expenditures, 1914-15.*—\$6,000 (purchase and distribution of valuable seeds).

**Demonstration Work in Horticulture:**

*Object.*—To assist farmers to plan suitable truck-crop marketing systems with special reference to boll-weevil areas.

*Cooperation.*—Private individuals, State experiment stations.

*Location.*—Gulf and Atlantic Coast States.

*Date begun.*—1904.

*Results.*—Increased trucking areas in the boll-weevil districts.

*Assignment.*—Wm. Stuart, D. N. Shoemaker, and H. C. Thompson.

*Proposed expenditures, 1914-15.*—No allotment; incidental to other work.

**School-Garden Work:**

*Object.*—To stimulate interest in horticulture among teachers and children of urban and rural districts.

*Cooperation.*—Teachers throughout the United States.

*Location.*—Washington, D. C.

*Date begun.*—1903.

*Results.*—Data in Farmers' Bulletin 218; annual distribution of flower and vegetable seed; work carried on chiefly by correspondence.

*Assignment.*—L. C. Corbett.

*Proposed expenditures, 1914-15.*—No allotment; incidental to other work.

**Total, Landscape Gardening, Floriculture, and Miscellaneous Horticultural Investigations,** \$15,800 (general expenses, \$5,340; purchase and distribution of valuable seeds, \$6,000; statutory, \$4,460).

**Total, Horticultural Investigations,** \$83,790 (general expenses, \$56,320; purchase and distribution of valuable seeds, \$12,840; statutory, \$14,630).

**ARLINGTON FARM.****Arlington Farm:**

*Object.*—To maintain a field laboratory for the various bureaus and offices of the Department of Agriculture.

*Cooperation.*—Various bureaus and offices of the department.

*Location.*—Rosslyn, Va.

*Date begun.*—1900.

*Results.*—The farm has furnished the necessary land, labor, equipment of teams, special improved implements, and various devices necessary in connection with the development of the farm and the extensive experimental work of the bureaus and offices of the department which have had projects under investigation there. In addition to the erection of buildings, greenhouses, and heating and cold-storage plants, and the provision of various special facilities for experimental purposes, the soil conditions have been greatly improved, drainage system extended, the farm marsh cleared, farm roads improved, and the fruit and ornamental plantings developed to a stage which makes them more interesting and valuable. New buildings are being erected, new equipment installed, the experimental work continued and extended, and the work on the farm is expanding in keeping with the general growth of the department.

*Assignment.*—L. C. Corbett, E. C. Butterfield, and J. H. Criswell.

*Proposed expenditures, 1914-15.*—\$29,260 (general expenses, \$15,000; statutory, \$14,260).

**FOREIGN SEED AND PLANT INTRODUCTION.****GENERAL DIRECTION OF PLANT INTRODUCTIONS.****Administration:**

*Object.*—To secure new and valuable seeds and plants for experimenters of this country; careful placing of same; supervision of office force; maintenance of a large collection of photographs illustrating useful foreign plants and plant industries.

*Cooperation.*—Private individuals, botanic gardens, agricultural experiment stations, and other domestic and foreign institutions.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Over 38,000 varieties of seeds and plants, etc., have been introduced and distributed to experimenters since 1897, when Section of Seed and Plant Introduction was established.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—\$30,180 (general expenses, \$16,260; statutory, \$13,920).

**Plant Inventory and Records:**

*Object.*—To keep records of introductions; prepare and furnish experimenters, plant breeders, and others in foreign countries with explorers' notes indicating material desired for introduction; keep list of applicants for introductions, list of experimenters in this country, and list of foreign correspondents; publish quarterly Inventory of Seeds and Plants Imported and Bulletin of Foreign Plant Introductions and maintain an extensive seed collection; to purchase American plants for exchange with foreign countries and to conduct domestic investigations of introduced plants.

*Cooperation.*—State experiment stations and private individuals.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Assignment.*—David Fairchild, S. C. Stuntz, H. C. Skeels.

*Proposed expenditures, 1914-15.*—\$12,150 (general expenses, \$9,470; statutory, \$2,680).

**Total, General Direction of Plant Introductions, \$43,290** (general expenses, \$25,730; statutory, \$17,560).

**FOREIGN EXPLORATIONS.****Major Foreign Explorations:**

*Object.*—To explore the plant industries of foreign countries with a view to securing new varieties of plants and data which will aid in their establishment in America, as well as to discover the wild relatives of cultivated plants useful for breeding with them; includes work of expeditions and special explorers completed within one fiscal year, heretofore appearing as separate yearly projects.

*Cooperation.*—Various bureaus and offices of the department and foreign agricultural institutions and our consular officers abroad.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—An expedition to the Bahia navel-orange region of Brazil determined the variability of this variety and its origin; also secured a large number of new forage grasses, fruits, and ornamental plants. An explorer in Nubia secured offshoots of valuable date varieties and other dry-land plants. An exploring party in Guatemala secured plant material of special hard-shelled avocados, a new salad palm, and other subtropical fruits.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—\$13,490 (general expenses, \$11,390; statutory, \$2,100).

**Minor Foreign Explorations:**

*Object.*—To secure, through special arrangements by correspondence, rare and valuable seeds and plants from foreign countries and to prosecute a seed and plant exchange.

*Cooperation.*—Collaborators, consuls, missionaries, special experimenters, and foreign correspondents, including foreign officials.

*Location.*—Washington, D. C.

*Date begun.*—1907.

**Minor Foreign Explorations—Continued.**

*Results.*—Correspondence list established with the principal plant experts of the world, and through them have been secured thousands of new introductions, such as the Manukka (a new seedless grape), Sudan grass, the feterita sorghum, new cowpeas and soy beans, the Lyon velvet bean, etc.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Northwestern China Explorations:**

*Object.*—The exploration of Russia, Siberia, Manchuria, and China for introductions adapted to the Mississippi Valley and northwestern Great Plains.

*Cooperation.*—Russian and Chinese Government officials; American and foreign consular officers, and private individuals.

*Location.*—Russia, Siberia, Manchuria, and China.

*Date begun.*—1912.

*Results.*—Introduction of improved varieties of jujubes, *Amygdalus davidiana*, Chinese persimmons, alfalfas, new poplars, willows, Chinese cabbage, waxy-kerneled corn, bush cherries, etc.

*Probable date of completion.*—1915.

*Assignment.*—David Fairchild, Frank N. Meyer.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**Total, Foreign Explorations,** \$22,490 (general expenses, \$20,390; statutory, \$2,100.)

**PLANT INTRODUCTION FIELD INVESTIGATIONS.****Chico Plant Introduction Field Station:**

*Object.*—To receive, record, propagate, and test valuable seeds and plants.

*Location.*—Chico, Cal.

*Date begun.*—1904.

*Results.*—During the year 1913-14 several hundred thousand plants were propagated and 117,000 distributed, including a large number of wood-oil trees, plants of *Amygdalus davidiana*, figs, pistache, grapes, jujubes, etc.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, and R. L. Beagles.

*Proposed expenditures, 1914-15.*—\$15,160 (general expenses, \$8,960; statutory, \$6,200).

**Miami Plant Introduction Field Station:**

*Object.*—To receive, record, propagate, and test valuable seeds and plants.

*Location.*—Miami, Fla.

*Date begun.*—1907.

*Results.*—A large number of tropical and semitropical plants tested and distributed, propagation of papaya by grafting, cross fertilization of citrus, experiments on mango spraying for prevention of fungous diseases, improvement of soil conditions by use of new leguminous plants; 25 acres additional secured for future work.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, and Edw. Simmonds.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses, \$3,680; statutory, \$1,320).

**Brooksville Plant Introduction Field Station:**

*Object.*—To grow, propagate, experiment with, and distribute bamboo and other new and useful plants.

*Location.*—Brooksville, Fla.

*Date begun.*—1909.

*Results.*—Bamboo plantings have been made and a number of rhizomes will soon be available for distribution; citrus and dasheens (a new root crop) planted; 76,000 pounds of dasheens harvested and 51,000 pounds distributed during 1913-14; new forage crops tested and propagated.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, and Wm. H. F. Gomme.

*Proposed expenditures, 1914-15.*—\$6,500 (general expenses).

**Rockville Plant Introduction Field Station:**

*Object.*—To receive, record, propagate, test, and distribute valuable seeds and plants.

*Location.*—Near Rockville, Md.

*Date begun.*—1910.

**Rockville Plant Introduction Field Station—Continued.**

*Results.*—Forty-nine thousand (49,000) plants, including a large number of grapes, windbreak plants, wood-oil trees, *Amygdalus*, etc., propagated and distributed within the United States.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, and J. M. Rankin.

*Proposed expenditures, 1914-15.*—\$14,500 (general expenses, \$9,340; statutory, \$5,160).

**Avocado Introduction:**

*Object.*—To introduce, test, propagate, and distribute rare and valuable varieties of avocados (alligator pears) and establish avocado culture on a commercial basis in the United States.

*Cooperation.*—Private individuals and firms.

*Location.*—Plant introduction field stations at Miami, Fla., Rockville, Md., and Chico, Cal.

*Date begun.*—1909.

*Results.*—Several hundred different introductions for propagation, testing, and distribution.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in amounts allotted to field stations.

**Guava Introduction:**

*Object.*—To introduce the best-known varieties and secure by budding better varieties adapted to the climate of the United States.

*Location.*—Same as preceding project.

*Date begun.*—1909.

*Results.*—Propagation and distribution of nearly 100 different introductions of this fruit.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Udo Introduction:**

*Object.*—To demonstrate the possibility of the successful commercial growing of this Japanese vegetable and to secure the best varieties for cooperative work.

*Location.*—Plant introduction field stations at Rockville, Md., and Chico, Cal.

*Date begun.*—1902.

*Results.*—Propagation of 20,000 plants during the year 1913-14; distribution of plants and seeds to parties all over the United States.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Mango Introduction:**

*Object.*—To encourage the establishment of commercial mango growing in this country.

*Location.*—Plant introduction field stations at Rockville, Md., Chico, Cal., and Miami, Fla.; cooperators in California and Florida.

*Date begun.*—1900.

*Results.*—Nearly 400 different introductions propagated, tested, and distributed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in Miami Field Station allotment.

**Introduction of Yautias, Taros, and Dasheens:**

*Object.*—To introduce a tuberous root crop into the warmer sections of the United States on lands ill adapted to Irish potato culture.

*Location.*—Plant introduction field station at Brooksville, Fla.

*Date begun.*—1905.

*Result.*—Seventy-six thousand (76,000) pounds of dasheens grown last year and 51,000 pounds distributed; tests made with dasheen flour; shoots used like asparagus and greens as substitute for spinach.

*Assignment.*—David Fairchild, R. A. Young, and Wm. H. F. Gomme.

*Proposed expenditures, 1914-15.*—Included in allotment for Brooksville Plant Introduction Field Station, approximately \$800.

**Bamboo Introduction:**

*Object.*—To introduce and establish timber bamboo into sections of the United States where this plant will succeed and to encourage its planting in commercial quantities.

*Cooperation.*—McIlhenny Co., Avery Island, La.

**Bamboo Introduction—Continued.**

*Location.*—California, Louisiana, Florida, and Maryland.

*Date begun.*—1907.

*Results.*—Over 100 different introductions tested; 3 acres of timber bamboos growing at Brooksville, Fla.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, and Wm. H. F. Gomme.

*Proposed expenditures, 1914-15.*—Included in field-station allotments.

**Litchi Introduction:**

*Object.*—To introduce and establish this Chinese fruit in the United States.

*Location.*—Plant introduction field stations at Rockville, Md., Chico, Cal., and Miami, Fla.

*Date begun.*—1907.

*Results.*—About 50 different introductions propagated and distributed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Almond Introduction:**

*Object.*—To secure and introduce better varieties of almonds.

*Location.*—California and Florida.

*Date begun.*—1907.

*Results.*—Over 100 different introductions propagated and distributed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Globe Artichoke and Chayote Introduction:**

*Object.*—To place better strains and varieties in the hands of cooperators and experimenters throughout southwestern sections of the United States.

*Location.*—California, Maryland, and Florida.

*Date begun.*—1910.

*Results.*—Plants and seeds introduced, propagated, and distributed to cooperators.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Wood-Oil Tree Introduction:**

*Object.*—To introduce, establish, and grow wood-oil trees commercially in the United States.

*Cooperation.*—Collaborators and private individuals.

*Location.*—Alabama, Georgia, Florida, and California.

*Date begun.*—1905.

*Results.*—Twenty-five thousand wood-oil trees propagated and distributed during the past year; several hundred acres planted in and around Tallahassee, Fla., for the purpose of testing commercially.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset, R. L. Beagles.

*Proposed expenditures, 1914-15.*—Included in Chico and Rockville field-station allotments.

**Minor Plant Introductions:**

*Object.*—To introduce, propagate, and distribute seeds and plants other than those covered in specific projects.

*Location.*—Plant introduction field stations.

*Date begun.*—1910.

*Results.*—A large number of miscellaneous seeds and plants introduced, propagated, and distributed.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Introduction of Chinese Jujubes:**

*Object.*—To introduce this fruit into semiarid warm sections of the United States.

*Location.*—Plant introduction field stations at Chico, Cal., and Miami, Fla.

*Date begun.*—1910.

*Results.*—Many different varieties introduced, propagated, and distributed; agricultural explorer now in jujube district of China.

*Assignment.*—David Fairchild, P. H. Dorsett, Peter Bisset.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Introduction of Carob Trees:**

*Object.*—To import, propagate, and distribute the most promising productive varieties of this tree and determine the best pollinating varieties and best methods of establishing orchards in this country.

*Location.*—Plant introduction field station at Chico, Cal.

*Date begun.*—1910.

*Results.*—Most productive varieties introduced, propagated, and distributed.

*Assignment.*—David Fairchild, P. H. Dorsett.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Persimmon Introduction:**

*Object.*—To introduce large forms of Chinese varieties of persimmons and the best varieties from other sections.

*Cooperation.*—State agricultural experiment stations and private parties.

*Location.*—North Carolina, Florida, Georgia, and California.

*Date begun.*—1910.

*Results.*—Over 400 different introductions propagated and distributed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Introduction of Street and Park Plants:**

*Object.*—To introduce, propagate, and distribute new and rare varieties of shrubs, trees, and other plants for testing to determine their economic importance for civic improvement purposes.

*Location.*—Washington, D. C., and plant introduction field stations.

*Date begun.*—1911.

*Results.*—A large number of varieties of plants deemed suitable for street and lawn plantings introduced and distributed.

*Assignment.*—David Fairchild, Peter Bisset.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Date-Palm Introduction:**

*Object.*—To import varieties of dates and to establish date growing on a commercial basis in such sections of the United States as are adapted to the growth and development of the trees.

*Location.*—Washington, D. C.

*Date begun.*—1899.

*Results.*—Importations made from Egypt, Algeria, Tunis, Morocco, Nubia, and from the oases of the Great Sahara. During the past year an expedition to Egypt after palms was financed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Included in allotment for major foreign explorations.

**Introduction of Pistache Nuts:**

*Object.*—To introduce from foreign countries improved varieties of the pistache and propagate same for distribution.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Superior budded varieties and stocks distributed in quantity.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Grape Introductions:**

*Object.*—To introduce from foreign countries improved varieties of grapes.

*Location.*—Washington, D. C.

*Date begun.*—1903.

*Results.*—Several thousand vines grown at the plant introduction field stations for distribution and about 10,000 cuttings distributed.

*Assignment.*—David Fairchild.

*Proposed expenditures, 1914-15.*—Nominal; included in field-station allotments.

**Total, Plant Introduction Field Investigations, \$41,160** (general expenses, \$28,480; statutory, \$12,680).

**Total, Foreign Seed and Plant Introduction, \$105,980** (general expenses, \$74,600; statutory, \$31,380).

## FORAGE-CROP INVESTIGATIONS.

**Office:**

*Object.*—To conduct necessary clerical work and general supervision of scientific investigations of office.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—C. V. Piper.

*Proposed expenditures, 1914-15.*—\$12,360 (new and rare seeds, \$9,240; statutory, \$3,120).

**Alfalfa Investigations:**

*Object.*—To test and develop by breeding and selection and to establish new varieties of alfalfa, especially hardy and drought-resisting strains suitable for the Southwest; to extend the profitable culture of alfalfa in the East.

*Cooperation.*—Bureau of Entomology at Murray, Utah, in connection with weevil investigations; private individuals in the East.

*Location.*—Redfield, S. Dak.; Moccasin, Mont.; Aberdeen, Idaho; Murray, Utah; Chico, Cal.; Hays, Kans.; Amarillo and Chillicothe, Tex.; and various points in Pennsylvania, New Jersey, Delaware, Maryland, Virginia, and North Carolina.

*Date begun.*—1905.

*Results.*—Introduction and establishment of superior strains of alfalfa; development of numerous hybrids; determination of the processes by which flowers become fertilized in the field; extension of alfalfa in various regions where it is unknown or but little used. Data published in Farmers' Bulletins 339 and 495, B. P. I. Circular 24, and B. P. I. Bulletin 169.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$10,905 (new and rare seeds, \$9,905; statutory, \$1,000).

**Clover Investigations:**

*Object.*—To develop by breeding and selection hardy, heavy-yielding strains of clovers with desirable seed and forage qualities; to determine relative merits of various varieties of clover and cloverlike plants; to determine causes and means of overcoming clover failures; to improve present methods of clover-seed production.

*Cooperation.*—Indiana, Iowa, and North Dakota Experiment Stations, and private individuals throughout the northern and eastern halves of the United States.

*Location.*—Lafayette, Ind.; Ames, Iowa; Fargo, N. Dak.; New London, Ohio; Arlington, Va.; and individual cooperators throughout the United States, especially in Southern, Northern, and Northwestern States.

*Date begun.*—1905.

*Results.*—Improved methods of securing stands and methods of obtaining better seed crops; data published in Farmers' Bulletins 455, 485, 550, and 579.

*Probable date of completion.*—1918.

*Assignment.*—J. M. Westgate.

*Proposed expenditures, 1914-15.*—\$7,908 (new and rare seeds, \$7,008; statutory, \$900).

**Sorghum Investigations:**

*Object.*—To determine the best methods of culture, test promising imported varieties, breed strains better adapted to local conditions, and determine the silage value of sorghum as compared with corn and other crops.

*Cooperation.*—Texas, Kansas, and South Dakota Experiment Stations.

*Location.*—Arlington, Va.; Chillicothe and Amarillo, Tex.; Hays, Kans.; Redfield, S. Dak.; Monetta, S. C.; and individual cooperators throughout Southern and Western States.

*Date begun.*—1905.

*Results.*—Introduction and establishment of new varieties of sorghum, of which feterita is the most noteworthy; improved methods of culture; data published in Farmers' Bulletin 458.

*Probable date of completion.*—1920.

*Assignment.*—H. N. Vinall.

*Proposed expenditures, 1914-15.*—\$5,417 (new and rare seeds).

**Dry-Land Forage Crops Other than Sorghums:**

*Object.*—To test all forage crops believed to be of value in dry-land agriculture, improve standard crops by breeding, and determine the best cultural methods for such crops.

*Cooperation.*—Texas, Oregon, and Kansas Experiment Stations, and individual cooperators throughout the Great Plains area.

*Location.*—Hays, Kans.; Chillicothe and Amarillo, Tex.; Moro and Burns, Oreg.

*Date begun.*—1908.

*Results.*—The most important work accomplished in connection with this project has been the results obtained in investigations with millets and field peas, the results of which are ready for publication; other results published in B. P. I. Circulars 80 and 122; Farmers Bulletins on foxtail millets and field peas in course of preparation.

*Assignment.*—H. N. Vinall.

*Proposed expenditures, 1914-15.*—\$7,600 (new and rare seeds, \$6,700; statutory, \$900).

**Timothy Breeding:**

*Object.*—To secure by breeding and to establish agriculturally improved strains of timothy.

*Cooperation.*—Ohio Experiment Station.

*Location.*—New London, Ohio.

*Date begun.*—1905.

*Results.*—A number of superior strains of timothy have been secured, which are being multiplied as rapidly as possible for general dissemination.

*Probable date of completion.*—1919.

*Assignment.*—M. W. Evans.

*Proposed expenditures, 1914-15.*—\$2,160 (new and rare seeds).

**Pasture Investigations:**

*Object.*—To determine the best methods of handling pastures so as to secure the maximum carrying capacity.

*Cooperation.*—Virginia Experiment Station.

*Location.*—Blacksburg, Va.; work to be extended to New England and Northwestern States.

*Date begun.*—1909.

*Results.*—It has been demonstrated that on bluegrass lands continuous pasturing is better than alternate pasturing, and heavy pasturing better than light pasturing; the results of harrowing have not been beneficial; data published in Virginia Experiment Station Bulletin 204.

*Assignment.*—C. V. Piper, R. A. Oakley.

*Proposed expenditures, 1914-15.* \$3,500 (new and rare seeds).

**Sudan Grass:**

*Object.*—To determine the agronomic value of this newly introduced grass and to secure disease-resistant strains.

*Cooperation.*—Temporary cooperation with several experiment stations, including practically all in the semiarid regions.

*Location.*—Arlington, Va.; Gainesville, Fla.; Baton Rouge, La.; Chillicothe and Amarillo, Tex.; Hays, Kans.; Redfield, S. Dak.; and Moro, Oreg.

*Date begun.*—1909.

*Results.*—The high value of Sudan grass, not only for the arid but for the humid regions, has been demonstrated. The promise is that the seed crop of the present year will be large enough to meet all demands. Data published in B. P. I. Circular 125 and Yearbook for 1913; a Farmers' Bulletin now in course of publication.

*Probable date of completion.*—1917.

*Assignment.*—H. N. Vinall.

*Proposed expenditures, 1914-15.*—\$1,000 (new and rare seeds).

**Rhodes Grass:**

*Object.*—To determine the agronomic value of this newly introduced foreign grass.

*Cooperation.*—Most of the southern experiment stations are carrying out plat work on plans prepared by the department.

*Location.*—The cotton States and Arlington, Va.

**Rhodes Grass—Continued.**

*Date begun.*—1910.

*Results.*—Rhodes grass has shown its high value for Florida and the Gulf coast region, where it is being now largely planted.

*Probable date of completion.*—1917.

*Assignment.*—C. V. Piper, R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$500 (new and rare seeds).

**Cowpeas:**

*Object.*—To test and breed new and improved varieties; to determine best methods as to harvesting and thrashing of seed.

*Cooperation.*—Informal cooperation with various experiment stations.

*Location.*—Arlington, Va., and Monetta, S. C.

*Date begun.*—1905.

*Results.*—Introduction and agricultural establishment of the Brabham and Groit varieties; several other varieties of extremely high promise under test, the best of which will also be commercialized; data in B. P. I. Bulletin 229, B. P. I. Circular 124, and Farmers' Bulletin 318.

*Probable date of completion.*—1920.

*Assignment.*—W. J. Morse.

*Proposed expenditures, 1914-15.*—\$2,070 (new and rare seed).

**Soy Beans:**

*Object.*—To determine the most valuable of the numerous varieties of soy beans, secure new improved varieties by breeding, determine their best methods of culture and harvesting, and bring about increased use of the crop, especially for oil-seed production.

*Cooperation.*—A number of State experiment stations.

*Location.*—Arlington, Va.

*Date begun.*—1905.

*Results.*—About 500 introductions have been tested. Of these introductions and selections from them, 10 of the best have been introduced and commercialized, taking the place of most of the older varieties on the market. Two varieties especially suited for northern conditions are now ready for the market.

*Probable date of completion.*—1920.

*Assignment.*—W. J. Morse.

*Proposed expenditures, 1914-15.*—\$2,500 (new and rare seeds).

**Velvet Beans:**

*Object.*—To compare different species of *Stizolobium* and secure new varieties by breeding, especially with the object of securing a bushy variety.

*Cooperation.*—Florida Experiment Station.

*Location.*—Biloxi, Miss., and Brooksville and Miami, Fla.

*Date begun.*—1905.

*Results.*—The introduction of Yokohama and Chinese velvet beans and the development of hybrids from these introductions; results published in B. P. I. Bulletins 141 (part 3) and 179.

*Probable date of completion.*—1920.

*Assignment.*—S. M. Tracy.

*Proposed expenditures, 1914-15.*—\$2,000 (new and rare seeds).

**Vetches:**

*Object.*—To test all the different varieties of this crop and breed improved strains.

*Cooperation.*—Informal cooperation with Oregon Experiment Station.

*Location.*—Chico, Cal.; Corvallis, Oreg.; and Arlington, Va.

*Date begun.*—1905.

*Results.*—Culture and interest in hairy vetch greatly extended. The work has also resulted in the commercialization of purple vetch, a species which is valuable for hay in western Oregon and green manure in California, a much better seed producer than common vetch. Results published in Farmers' Bulletin 515, B. P. I. Bulletin 190, and B. P. I. Circular 102.

*Probable date of completion.*—1920.

*Assignment.*—Roland McKee.

*Proposed expenditures, 1914-15.*—\$3,000 (new and rare seeds).

**Total, Forage-Crop Investigations, \$60,920** (new and rare seeds, \$55,000; statutory, \$5,920).

**SEED DISTRIBUTION.****ADMINISTRATION.****Administration:**

*Object.*—Supervision of administrative details relating to the congressional seed distribution; receiving and mailing of seeds, bulbs, and plants; handling of congressional correspondence and franks.

*Location.*—Washington, D. C.

*Date begun.*—Distribution inaugurated in Patent Office in 1839; transferred to the Department of Agriculture in 1862, and transferred to the Bureau of Plant Industry in 1902.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$56,080 (purchase and distribution of valuable seeds, \$9,500; new and rare seeds, \$6,000; statutory, \$40,580).

**CONGRESSIONAL DISTRIBUTION.****Vegetable and Flower Seeds:**

*Object.*—Purchasing, testing, packeting, franking, assembling, and mailing of vegetable and flower seeds for congressional distribution.

*Location.*—Washington, D. C.

*Date begun.*—Patent Office, 1839; Department of Agriculture, 1862; Bureau of Plant Industry, 1902.

*Results.*—Encouragement of planting of home gardens in the United States by the distribution of standard varieties of garden seeds of known value and of the best quality.

*Assignment.*—R. A. Oakley, J. E. W. Tracy.

*Proposed expenditures, 1914-15.*—\$221,360 (purchase and distribution of valuable seeds).

**Cotton Seed:**

*Object.*—Purchasing, testing, packeting, franking, and mailing of cotton seed for congressional distribution.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Establishment of better grades of high-yielding strains of cotton in the South.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$7,500 (new and rare seeds).

**Tobacco Seed:**

*Object.*—Purchasing, testing, packeting, franking, assembling, and mailing of tobacco seed for congressional distribution.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Introduction of improved strains of tobacco.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$800 (purchase and distribution of valuable seeds).

**Lawn-Grass Seed:**

*Object.*—Purchasing, testing, packeting, franking, assembling, and mailing of lawn-grass seed for congressional distribution.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Establishment of better lawns throughout the United States.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$2,500 (purchase and distribution of valuable seeds).

**Strawberry Plants and Grapevines:**

*Object.*—Congressional distribution of strawberry plants and grapevines.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Encouragement of the growing of small fruits in the home garden.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$2,500 (purchase and distribution of valuable seeds).

**Miscellaneous Seeds and Plants:**

*Object.*—Congressional distribution of miscellaneous seeds and plants.

*Location.*—Washington, D. C.

*Date begun.*—Patent Office, 1839; Department of Agriculture, 1862; Bureau of Plant Industry, 1902.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$4,000 (purchase and distribution of valuable seeds).

**Dutch Bulbs:**

*Object.*—Congressional distribution of Dutch bulbs.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$2,500 (purchase and distribution of valuable seeds).

**Seed Cleaning:**

*Object.*—Removing impurities from seeds purchased by the department for congressional distribution; testing of seed-cleaning devices.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Large quantities of vegetable, flower, and field seeds cleaned before distribution; success obtained in the cleaning of senna and celery seed; new method devised for the cleaning of beet seed.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$1,000 (purchase and distribution of valuable seeds).

**Total, Congressional Distribution, \$242,160** (purchase and distribution of valuable seeds, \$234,660; new and rare seeds, \$7,500).

**NEW AND RARE SEED.****Testing and Propagation:**

*Object.*—To test new and rare field seeds to determine their suitability to various sections of the country; to propagate promising strains for planting on field scale.

*Location.*—Washington, D. C., Arlington, Va., and various field stations.

*Date begun.*—July 1, 1914.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$11,500 (new and rare seeds).

**Purchase and Distribution:**

*Object.*—The purchase and distribution of new and rare field seeds for the purpose of introducing into practical agriculture new and valuable crops needed in the improvement and development of agriculture. It is planned to purchase new and rare field seeds, such as Grimm and Canadian variegated alfalfa, feterita, Sudan grass, Tepary beans, Kursk millet, Brabham and Groit cowpeas, new varieties of soy beans, Yokohama and Chinese velvet beans, new varieties of wheat, corn, etc., to test the seeds for purity and germination, and distribute the seeds in sufficient quantity for each recipient to plant 1 acre. The distribution will be made on a congressional quasi-quota basis, whereby each interested Congressman will be notified that certain seeds adapted to his district are available and that not to exceed a definite number of requests from his constituents for such seed will be honored.

*Location.*—Washington, D. C.

*Date begun.*—July 1, 1914.

*Assignment.*—R. A. Oakley.

*Proposed expenditures, 1914-15.*—\$92,500 (new and rare seeds).

**Total, Seed Distribution, \$402,240** (purchase and distribution of valuable seed, \$244,160; new and rare seeds, \$117,500; statutory, \$40,580).

**FOREST SERVICE.****FORESTER AND DISTRICT FORESTERS.**

(HENRY S. GRAVES, Forester.)

**General Administration:**

*Object.*—General direction, administration, supervision, and control of all activities in the Washington office, 7 district offices, and 163 national forests.

*Location.*—Washington, D. C.; Missoula, Mont.; Denver, Colo.; Albuquerque, N. Mex.; Ogden, Utah; San Francisco, Cal.; Portland, Oreg.

*Date begun.*—Division of Forestry organized as administrative unit in 1881.

*Assignment.*—Forester, Associate Forester, and district foresters.

*Proposed expenditures, 1914-15.*—Washington, \$23,820; districts, \$71,600.

**Law Work:**

*Object.*—Performance of all legal work on behalf of the Forest Service.

*Cooperation.*—Department of Justice.

*Location.*—Washington, D. C., and district headquarters.

*Date begun.*—December 3, 1903; transferred to Solicitor's Office in 1910.

*Assignment.*—Assistants to the Solicitor.

*Proposed expenditures, 1914-15.*—Washington, \$7,700; districts, \$35,520.

**Accounts:**

*Object.*—To receive and disburse the money and keep the financial and appointment records of the Forest Service.

*Location.*—Washington, D. C., and district headquarters.

*Date begun.*—February, 1905; present organization established in December, 1908.

*Assignment.*—Fiscal Agent and the district fiscal agents.

*Proposed expenditures, 1914-15.*—Washington, \$21,800; districts, \$62,300.

**Editorial Office:**

*Object.*—Supervision and conduct of activities for promoting public education in and widespread practice of forestry; preparation of Forest Service manuscripts for publication, proof reading, handling of requests for publications and of job printing, and development, custody, and use of exhibit material and lantern slides.

*Cooperation.*—Exposition authorities desiring the use of exhibit material without cost to the Government; teachers and others desiring the use of lecture materials or sets of photographs for purposes of public instruction.

*Location.*—Washington, D. C.

*Date begun.*—August 19, 1905.

*Results.*—In 1913 prepared for official publication 52 manuscripts; cared for all printing matters; distributed information; made 347 loans of lantern slides; 9 loans of exhibit material, and 11 loans of sets of photographs to school and library authorities; colored 1,202 lantern slides, 83 bromides, and 33 transparencies.

*Assignment.*—Editor and assistants.

*Proposed expenditures, 1914-15.*—Washington, \$35,960.

**Supply Depot and Property Auditor:**

*Object.*—To furnish necessary instruments, equipment, and supplies, and to keep proper record of same.

*Location.*—Ogden, Utah.

*Date begun.*—April, 1907.

*Assignment.*—Property clerk and property auditor.

*Proposed expenditures, 1914-15.*—Ogden, \$132,620.

**Total, Forester and District Foresters,** \$391,120 (general expenses, \$229,060; statutory, Forest Service, \$140,560; statutory, Secretary's roll (law), \$21,500). The general expense funds are apportioned among subappropriations as follows: General administration, \$99,040; miscellaneous forest investigations, \$17,520; maintenance and supplies, \$112,500.

## OPERATION.

(JAMES B. ADAMS, Assistant Forester, in charge.)

**Administration and Supervision:**

*Object.*—To administer and supervise the business organization of the Forest Service and fire protection of the national forests. In the fiscal year 1914 there were 163 national forests with an area of approximately 186 million acres. The forest force provided by law consists of 151 supervisors, 80 deputy supervisors, 387 rangers, and 690 assistant forest rangers. The assistant district foresters in charge of operation in the 7 administrative districts, under the direction of the Forester and district foresters, have supervision over the organization and activities of the protective force of the national forests in their respective districts. (Quarters, maintenance, forage, and other administrative items are included here.)

*Location.*—Washington, D. C., district and national forest headquarters.

*Date begun.*—Administration of the national forests was provided for by act of Congress, June, 1897. Operation was organized as a branch in 1907.

*Assignment.*—Assistant forester in charge of branch, assistant district foresters, and forest supervisors.

*Proposed expenditures, 1914-15.*—Washington, \$128,010; districts, \$142,217; forests, \$1,045,828.

**Protection:**

*Object.*—Patrol of the forests, fire suppression, boundary survey, etc.

*Cooperation.*—Forest users, railroad companies, and owners of timberland.

*Location.*—National forests.

*Date begun.*—The first express appropriation for the protection of the public timber lands was passed in 1872.

*Assignment.*—Forest rangers, assistant forest rangers, and guards.

*Proposed expenditures, 1914-15.*—Forests, \$1,394,439.

**Geography:**

*Object.*—Preparation of forest maps and photographs, compilation of forest statistics, and determination of legal status of lands within the national forests.

*Cooperation.*—Geological Survey and General Land Office.

*Location.*—Washington, D. C., and district headquarters.

*Date begun.*—July 1, 1907, as Atlas; present office established July 1, 1908.

*Results.*—The office of Geography includes the sections of Atlas, Drafting, Photography, and Status. Its operations during the fiscal year 1913 covered the following: 1,421 maps platted from field notes or copied; 335 drawings made; cooperation in the preparation of lithograph plates for 86 folios and maps from which 53,091 prints were made; 4,578 negatives developed and 76,977 photo-prints made; 409 bromide enlargements and transparencies; 1,500 lantern slides; 88 albums; 3,056 maps prepared and supplied to members of the service and to the public; and 6,096 titles abstracted.

*Assignment.*—Geographer and assistants.

*Proposed expenditures, 1914-15.*—Washington, \$67,740; districts, \$31,425.

**Improvements:**

*Object.*—Construction and repair of roads, trails, telephone lines, firebreaks, fences, corrals, buildings, bridges, water improvements, etc.

*Cooperation.*—States, counties, telephone companies, and other organizations in the construction and maintenance of roads, trails, telephone lines, etc.

*Location.*—National forests.

*Date begun.*—First specific appropriation for permanent improvements on the national forests was passed March 4, 1907.

*Results.*—The estimated value of permanent improvements on the national forests at the close of the fiscal year 1913 was \$3,500,000.

*Assignment.*—Engineers in the various districts.

*Proposed expenditures, 1914-15.*—Forests, \$760,000.

**Total, Operation,** \$3,569,659 (general expenses, \$1,752,721; statutory, \$1,448,93°; roads and trails (estimated), \$368,000). The general expense funds are apportioned among subappropriations as follows: General administration, \$120,993; miscellaneous forest investigations, \$21,100; maintenance and supplies, \$47,500; improvement of national forests, \$392,000; fighting forest fires, \$100,000; national forests, \$1,071,128.

**SILVICULTURE.**

(W. B. GREELEY, Assistant Forester, in charge.)

**ADMINISTRATIVE WORK.****General Administration:**

*Object.*—Administration of timber sales, timber reconnoissance, timber and fire trespass, reforestation, administrative use, free use, insect control, and silvicultural investigations on the national forests; also review and approval of working plans for the better administration of the forests and the conduct of the cooperative projects with Eastern States and timberland owners.

*Location.*—Washington, D. C., and district offices.

*Date begun.*—Silviculture was organized as a branch of the Forest Service in 1907.

*Assignment.*—Chief of branch and assistant district foresters in charge of silviculture.

*Proposed expenditures, 1914-15.*—Washington, \$18,440; districts, \$20,916.

**Timber Sales:**

*Object.*—Sale of timber on the national forests.

*Cooperation.*—Advice rendered upon request to States and homesteaders for disposal of timber contiguous to national forest timber proposed for sale.

*Location.*—Washington, D. C., Chicago, Ill., district offices, and national forests.

*Date begun.*—The first timber sales on national forests were made in 1899.

*Results.*—In 1913 over two billion board feet of timber, with a valuation of nearly  $4\frac{1}{2}$  million dollars, was contracted for sale from the national forests. Over  $3\frac{1}{2}$  billion board feet, valued at nearly \$6,400,000, were approved for advertisement and sale during the year.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—Washington, \$5,400; districts, \$32,278; forests, \$174,305.

**Timber Reconnoissance:**

*Object.*—To determine national forest timber resources, particularly available timber supplies.

*Location.*—Washington, D. C., district offices and national forests.

*Date begun.*—Summer of 1905.

*Results.*—During the fiscal year 1913 estimates, surveys, maps, and detailed data on the character and condition of the timber and methods of exploitation were obtained for 3,867,667 acres of national forest land.

*Assignment.*—Assistant district foresters.

*Proposed expenditures, 1914-15.*—Washington, \$2,800; districts, \$28,215; forests, \$209,166.

**Timber Trespass:**

*Object.*—To prevent the unlawful cutting of national forest timber, and to recover damages sustained from timber trespass.

*Cooperation.*—Department of the Interior in cases initiated by that department prior to the creation of the forest.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—The first express appropriation for the prevention of depredations on public timberlands was passed in 1872.

*Results.*—There has been a marked reduction in the amount of timber trespass on the national forests. At the end of the fiscal year 1913 there were 76 pending cases.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—Districts, \$263; forests, \$5,229.

**Fire Trespass:**

*Object.*—To prevent the destruction of national forest timber from fires attributable to negligence or malice, and to recover damages sustained from fire trespass.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—The first express appropriation for the prevention of depredations on public timberlands and for their protection was passed in 1872.

*Results.*—At the end of the fiscal year 1913 there were 27 fire trespass cases pending, as against 42 pending at the close of 1912, and 78 at the close of 1911.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—Districts, \$67; forests, \$1,743.

**Free Use:**

*Object.*—To grant free use of national forest timber for domestic purposes to bona fide settlers, miners, residents, and prospectors.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—The administration and use of the national forests was first provided for in June, 1897.

*Results.*—During the fiscal year 1913, 38,264 free-use permits were issued, aggregating 121,750,000 board feet of timber, valued at \$191,824.77.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—Districts, \$215; forests, \$24,403.

**Insect Control and Tree Diseases:**

*Object.*—The protection of national forests against insect infestation and fungous diseases.

*Cooperation.*—Bureau of Entomology, Bureau of Plant Industry, States, and private owners of timber contiguous to national forests.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—Summer of 1901.

*Results.*—Approximately 163,120 acres of infested national forest and contiguous timber owned by other parties were treated in the fiscal year 1913.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—Districts, \$3,290; forests, \$31,375.

**Reforestation:**

*Object.*—To reforest national forest areas entirely denuded or scantily covered with forest growth; also to secure seed and to maintain nurseries for the production of planting stock.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—Summer of 1901.

*Results.*—During the fiscal year 1913, 23,777.73 acres of national forest land were sown to tree seed, and 5,668.29 acres planted.

*Assignment.*—Assistant district foresters and national forest officers.

*Proposed expenditures, 1914-15.*—District, \$32,500; forests, \$244,026.

**Advice to and Cooperation with Wood-Lot and Timberland Owners:**

*Object.*—To furnish information on markets, timber values, and possible forms of utilization needed by the private owner to handle his woodlands to the best advantage and obtain adequate returns for stumpage. A series of publications is planned dealing by regions with forest management and reforestation, adapted particularly to small owners, keeping in touch with large and small timberland owners to secure improved methods of management through suggestion, experiment, or administration.

*Cooperation.*—There is an agreement with 26 States under which applications for examination of private wood lots are referred to the State forest organization.

*Location.*—Washington, D. C.

*Date begun.*—Summer of 1898.

*Results.*—During 1913, nine examinations were made of privately owned woodlands covering approximately 33,416 acres.

*Assignment.*—Assistant forester.

*Proposed expenditures, 1914-15.*—Washington, \$3,800.

**Library:**

*Object.*—Upkeep of Washington, district, supervisors', and forest experiment station libraries. The total number of books and pamphlets on forestry at the Forest Service in Washington is 17,097; total number of volumes in the district and supervisors' offices, Forest Products Laboratory, and experiment stations, 24,516.

*Location.*—Washington, D. C., district headquarters, national forests, and forest experiment stations.

*Date begun.*—1899.

*Assignment.*—Chief of Forest Investigations and Librarian.

*Proposed expenditures, 1914-15.*—Washington, \$3,800.

**Computation:**

*Object.*—Computation of field measurements for the entire Forest Service.

*Location.*—Washington, D. C.

*Date begun.*—Summer of 1901.

**Computation—Continued.**

*Results.*—During 1913, 33,000 forest measurements were worked up. These were elaborated into 70 volume, 13 yield, 16 form, 23 tree-growth, and 6 miscellaneous tables, and 208 copies of tables were distributed in answer to inquiries from lumbermen, timberland owners, and foresters.

*Assignment.*—Forest examiner in charge of computation.

*Proposed expenditures, 1914-15.*—Washington, \$12,100.

**State Cooperation:**

*Object.*—To assist States in conserving their forest resources, and to cooperate in protection of forested watersheds of navigable streams from fire, under section 2 of the Weeks law (Mar. 1, 1911).

*Cooperation.*—States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, West Virginia, Kentucky, Michigan, Wisconsin, Minnesota, South Dakota, Montana, Idaho, Washington, and Oregon.

*Location.*—Washington, D. C.

*Date begun.*—General cooperation with States in 1898; cooperation under Weeks law in spring of 1911.

*Results.*—The general cooperative work has resulted in encouraging a large number of States to adopt sound forest policies through the passage of progressive legislation. Cooperation under the Weeks law resulted in protecting approximately 10,000,000 acres of forest land, and in educating the people to the needs of fire protection.

*Assignment.*—Assistant forester and chief of State cooperation.

*Proposed expenditures, 1914-15.*—Washington, \$108,900.

**Total, Silviculture, Administrative Work, \$963,231** (general expenses, \$459,332; statutory, \$401,699; cooperative fire protection, \$102,200). The general expense funds are apportioned among subappropriations as follows: General administration, \$118,463; national forest planting, \$164,625; silvical investigations, \$9,100; national forests, \$167,144.

**INVESTIGATIVE WORK.**

(W. B. GREELEY, Assistant Forester, in charge; RAPHAEL ZON, Chief, Forest Investigations.)

**Dendrological Studies:**

*Object.*—To secure information concerning the distinguishing characteristics and geographical distribution of North American trees and shrubs.

*Cooperation.*—National Herbarium.

*Location.*—Washington, D. C.

*Date begun.*—Autumn of 1886.

*Results.*—During 1913 maps of botanical and commercial range were prepared for 13 pines, 21 ashes, and 8 other species; 3,000 new range points were added to the records, and an economic and taxonomic study of the shrubs of the genus *Ceanothus* was begun during the year.

*Assignment.*—Dendrologist, Chief of Section of Forest Distribution, and national forest officers.

*Proposed expenditures, 1914-15.*—Washington, \$8,400.

**Forestation:****(a) SEED STUDIES—**

*Object.*—To determine the best methods of seed extraction, comparative germination of seed in greenhouse and field, seed production, and the effect of source of seed upon the resulting stock, for most of the important timber trees of the western national forests. Nineteen experiments are now under way.

*Location.*—Forest experiment stations and nurseries on the national forests.

*Date begun.*—1910.

*Probable date of completion.*—Most of the studies will be completed by 1916.

*Assignment.*—Men in charge of forest experiment stations and nurseries on the national forests.

**(b) NURSERY PRACTICE—**

*Object.*—To determine the best amount of seed to sow, time of sowing, depth of covering seed, methods of sowing, fertilizing, shading, watering, root development, time and method of transplanting, and methods of retarding spring growth in nursery stock, with the principal timber trees on the western national forests. Ninety-nine experiments are now under way.

**Forestation—Continued.**

*Location.*—All forest experiment stations and nurseries.

*Date begun.*—1910.

*Probable date of completion.*—1916.

*Assignment.*—Men in charge of the forest experiment stations and nurseries on the national forests.

**(c) SOWING AND PLANTING STUDIES—**

*Object.*—To determine the best season and methods for sowing and planting in the field, the classes of stock to use, and the sites most suitable to the different species, for most of the important timber trees on the western national forests. One hundred and two experiments are now under way.

*Location.*—Forest experiment stations on the national forests and a number of forests where reforestation work is conducted.

*Date begun.*—Work begun at the stations in 1910.

*Probable date of completion.*—1916.

*Assignment.*—Men in charge of the forest experiment stations.

*Proposed expenditures, 1914-15.*—Forestation, \$17,421.

**Forest Influences:**

*Object.*—To determine the relation of forests to climate and stream flow, and also to obtain data necessary for a proper understanding of all silvicultural experiments in which the climatic factor enters into the results.

*Cooperation.*—Weather Bureau.

*Location.*—Forest experiment stations.

*Date begun.*—1910.

*Results.*—Progress made on several experiments, three experiments completed, and the results written up and published in the Monthly Weather Review and the Proceedings of the Society of American Foresters.

*Probable date of completion.*—Most of the studies will be completed by 1920.

*Assignment.*—Men in charge of forest experiment stations.

*Proposed expenditures, 1914-15.*—Districts, \$7,097.

**Management Studies:**

*Object.*—To determine the best methods of cutting in different forest types in order to secure natural reproduction in the shortest possible time. Thirty-five experiments are now under way.

*Location.*—Forest experiment stations and national forests.

*Date begun.*—1912.

*Assignment.*—Men in charge of forest experiment stations and local force on national forests.

*Proposed expenditures, 1914-15.*—Districts, \$16,975.

**Volume, Growth, and Yield Studies:**

*Object.*—To secure reliable data as to the growth, volume, and yield of the different species and types of forests as a basis for the proper handling of timber sales, management of the forests, and determining the damage caused by fire, trespass, etc. They are also to be used to establish certain laws of tree growth.

*Location.*—Washington, D. C., forest experiment stations, and national forests.

*Date begun.*—This work dates to the beginning of the Division of Forestry (1886), but has received more impetus within the last four years.

*Results.*—For 104 species there have been prepared 2,400 tables on volume, growth, and yield. In addition there were established over 300 permanent sample plats in all forest regions of the United States for the study of growth and yield of stands.

*Assignment.*—Chief of Office of Forest Investigations, men in charge of forest experiment stations, and local force on the national forests.

*Proposed expenditures, 1914-15.*—Washington and districts \$7,742.

**Protection Studies:**

*Object.*—To ascertain the extent of the effect caused by fire, grazing, disease, insects, animals, and climatic agencies, such as snow, hail, and wind, upon standing timber and natural reproduction.

*Cooperation.*—Bureau of Entomology, Bureau of Plant Industry, Biological Survey.

*Location.*—Forest experiment stations and national forests.

*Date begun.*—1910.

*Results.*—Methods have been developed for checking damping-off in forest nurseries, for greater utilization of defective trees, and for lessening the damage by rodents on the forested areas.

**Protection Studies—Continued.**

*Assignment.*—Men in charge of the forest experiment stations and local force on the national forests.

*Proposed expenditures, 1914-15.*—Districts, \$3,871.

**Tree Studies:**

*Object.*—To secure information concerning the important forest trees of this country as a basis for their proper management. Studies of nine species are now in progress.

*Location.*—Washington, D. C., and district headquarters.

*Date begun.*—1886.

*Results.*—Seventy-five publications on trees have been issued.

*Assignment.*—Office of Investigations and assistant district foresters in charge of silviculture.

*Proposed expenditures, 1914-15.*—Washington and districts, \$5,162.

**Lumbering Studies:**

*Object.*—To secure reliable data on methods and cost of logging and lumber manufacture and equipment employed, as a basis for stumpage appraisal and the development of proper relations between lumbering and forestry.

*Location.*—Washington, D. C., district offices, and national forests.

*Date begun.*—1913.

*Results.*—A publication on "Flume Construction" issued. Results applied to the administration of timber sales on national forests.

*Assignment.*—Lumbering engineers at Washington and district headquarters.

*Proposed expenditures, 1914-15.*—\$11,452.

**Total, Silviculture, Investigative Work, \$78,120** (Washington, \$38,320; districts, \$39,800; statutory, \$4,420; general expenses, \$73,700). The general expense funds are apportioned among subappropriations as follows: Silvicultural investigations, \$72,100; forest products, \$1,600.

**Total, Silviculture, \$1,041,351** (general expenses, \$533,032; statutory, \$406,119; cooperative fire protection, \$102,200). The general expense funds are apportioned among subappropriations as follows: General administration, \$118,463; national forest planting, \$164,625; silvicultural investigations, \$81,200; national forests, \$167,144; and forest products, \$1,600.

**PRODUCTS.**

(W. B. GREELEY, Assistant Forester, in charge.)

**INDUSTRIAL AND STATISTICAL INVESTIGATIONS.**

(O. T. SWAN, in charge.)

**Industrial and Statistical Investigations:**

*Object.*—Statistical and industrial studies of lumber manufacture, the wood-using industries, woods used in manufacture, methods of utilizing wood waste, lumber prices, specifications and grading rules, and the movement of lumber to and from the principal markets. Studies followed by commercial application of the results.

*Cooperation.*—Bureau of Plant Industry, Census Bureau, Bureau of Statistics, War Department, Panama Canal, trade organizations, and various States.

*Location.*—Washington, D. C., with supervision of work at national forest district headquarters.

*Date begun.*—1908.

*Results.*—In cooperation with the Bureau of Plant Industry and the State officials, study is being made of means of utilizing blight-killed chestnut timber, including the rate at which such timber loses commercial value, and the available markets. A comprehensive study of prevailing specifications for both rough and manufactured lumber is underway, and new specifications of great value to the trade have been made effective through association cooperation. Specifications for hickory handles have been prepared which have been widely adopted and result in the utilization of red hickory. The study of wood-using industries is being continued, showing the kind and amounts of wood required in various industries, the purpose for which the different species are employed and the extent of their use and present methods of manufacturers. Up to the present this work has been completed for 20 States. Annual statistics of lumber production are obtained.

**Industrial and Statistical Investigations—Continued.**

*Assignment.*—Engineer in charge of industrial investigations.

*Proposed expenditures, 1914-15.*—\$26,620 (statutory. \$6,320; general expenses, \$19,500; cooperative work, forest investigations, \$800). The general expense item is charged to subappropriation forest products.

**FOREST PRODUCTS LABORATORY.**

(W. B. GREELEY, Assistant Forester, in charge; HOWARD F. WEISS, director, Forest Products Laboratory.)

**Administration and Supervision:**

*Object.*—Administration and supervision of experimental investigations in the use, handling, and preservation of timber products. This item includes all overhead charges, such as accounts and purchase, maintenance of quarters, publication, drafting, photography, designing, stenography, library, mail, and files.

*Cooperation.*—University of Wisconsin and Bureau of Plant Industry. The building in which the laboratory is located is furnished by the University of Wisconsin, while the cost of maintenance is borne by the Forest Service.

*Location.*—Madison, Wis., branches in districts 5 and 6.

*Date begun.*—The Forest Products Laboratory was established at Madison, Wis., in 1908.

*Assignment.*—Director and staff.

*Proposed expenditures, 1914-15.*—\$29,920.

**Timber Physics:**

*Object.*—Investigation relating to microscopic structure of wood, to kiln drying, and to the principles involved in the change in condition in wood when it is subjected to different physical conditions.

*Cooperation.*—University of Wisconsin.

*Location.*—Madison, Wis.

*Date begun.*—1908.

*Results.*—Valuable results have been obtained with the experimental kiln in drying stock of high commercial value. Several publications issued.

*Assignment.*—Engineers in forest products.

*Proposed expenditures, 1914-15.*—\$18,151.

**Timber Tests:**

*Object.*—To determine the mechanical properties of American commercial woods.

*Cooperation.*—University of Wisconsin.

*Location.*—Madison, Wis., and Portland, Oreg.

*Date begun.*—1887.

*Results.*—About 4,000 tests each month are made at the Forest Products Laboratory. A final monograph concerning the results of the whole investigation will be prepared.

*Assignment.*—Engineers in timber tests.

*Proposed expenditures, 1914-15.*—\$32,490.

**Wood Preservation:**

*Object.*—To determine the most efficient preservative processes and types of plants for the treatment of timbers used in construction work.

*Cooperation.*—University of Wisconsin.

*Location.*—Madison, Wis.

*Date begun.*—1903.

*Results.*—During 1913 experiments were made in connection with wood paving blocks, the principal object being to determine whether tar in creosote retards the penetration of the oil into the wood, or has other disadvantages. Experiments were also carried on in the preservation of timber used in silo construction. Tests on the efficiency of various wood preservatives were continued. Experiments were made to show the value of various fractions of creosote in protecting southern yellow-pine piling on the Gulf coast from marine borers. Investigations were also made of the relative inflammability of woods. Experiments have been begun with various fire retardents, with a view to rendering the wood practically incombustible.

*Assignment.*—Engineers in wood preservation.

*Proposed expenditures, 1914-15.*—\$21,315.

**Distillates and Other Derived Products:**

*Object.*—To determine best methods of refining and grading wood turpentine, methods of analysis of, and specifications for turpentine, and distillations of wood, production of ethyl alcohol from sawdust, etc.

*Cooperation.*—University of Wisconsin.

*Location.*—Madison, Wis., and Portland, Oreg.

*Date begun.*—1908.

*Results.*—Distinct progress was made during the year in the investigation of the production of ethyl alcohol from wood waste. Through arrangements with a turpentine company in Michigan, a commercial test was made of Douglas fir to determine its suitability for the production of turpentine and rosin. Tests to determine the distillation yields of various species of hardwoods were continued. Results already secured in this study have made it possible for at least one hardwood company to utilize crooked logs, tops, and slabs heretofore wasted, and in this way practically to double the amount of timber used from the same acreage.

*Assignments.*—Chemist in charge of Section of Derived Products.

*Proposed expenditures, 1914-15.*—\$22,037.

**Chemical Pulp and Paper:**

*Object.*—Investigations into the suitability of different woods for the manufacture of pulp into the different chemical processes, and into the methods of increasing the efficiency of the various processes.

*Cooperation.*—University of Wisconsin and Bureau of Plant Industry.

*Location.*—Madison, Wis.

*Date begun.*—1905.

*Results.*—The experiments in grinding wood pulp at the Wausau laboratory afforded important data concerning variations in yield and quality of paper due to differences in power used, pressure upon the stones, and sharpness of the stones. In addition to species heretofore in use, a number of other species were shown to have commercial value for the manufacture of news print. The work outlined for this ground pulp laboratory at Wausau has now been completed.

*Assignment.*—Chemical engineers in forest products.

*Proposed expenditures, 1914-15.*—\$22,827.

**Total, Forest Products Laboratory,** \$146,740 (Madison, \$126,780; districts, \$19,960; general expenses, \$117,580; statutory, \$29,160). The general expense items are charged to subappropriation, forest products.

**Total Products,** \$173,360 (general expenses, \$137,080; statutory, \$35,480; cooperative work, forest investigations, \$800). The general expense item is charged to the subappropriation, forest products.

**GRAZING.**

(A. F. POTTER, Associate Forester, in charge.)

**ADMINISTRATIVE WORK.****Administrative Work:**

*Object.*—Administration and general supervision of all matters pertaining to the grazing of live stock upon national forest ranges, including recommendations to the Secretary of Agriculture regarding the number and kind of stock to be grazed on each forest each year; the establishment of grazing periods and grazing fees for each kind of stock; division of the range between different kinds of live stock and the owners thereof; general supervision of stock grazed upon the forests; prevention of stock losses; enforcement of Federal and State quarantine regulations; protection of fish and game; development of forage resources; prevention of damage to forest growths and watersheds; determination of improved methods of handling live stock; range reconnoissance; extermination of predatory animals.

*Cooperation.*—Bureau of Plant Industry; Bureau of Animal Industry; State sanitary officers; State fish and game wardens; over 125 officially recognized organizations of stock growers using national forests.

*Location.*—Washington, D. C., district and national forest headquarters.

*Date begun.*—1905.

**Administrative Work—Continued.**

*Results.*—Receipts from grazing fees approximate \$1,000,000 per year. Average volume of permit business transacted: Paid permits 27,000, involving approximately 1,500,000 cattle, horses, and swine, and almost 8,000,000 sheep and goats, exclusive of natural increase and stock exempt from permit; free crossing permits, 2,800, authorizing the passage of about 60,000 cattle and horses and 5,000,000 sheep and goats; free permits on account of private land, 1,500, involving over 60,000 cattle and horses and 400,000 sheep and goats. Range conditions are from 25 to 100 per cent better than when national forests were created. Ranges have been equitably apportioned between qualified applicants. Orderly and systematic handling of the range has prevented overgrazing and improper use, lessened erosion, increased the forage productivity of denuded areas, eliminated friction between stock growers, checked the spread of stock disease, and protected each permittee in the use of his allotted range. The ravages of predatory animals have been reduced. Areas containing poisonous plants have been located and marked. All Federal and State quarantine regulations have been enforced. The range investigative work has resulted in the introduction of improved methods of handling stock, the utilization of previously unused ranges, and the general development of the forage resources.

*Assignment.*—One assistant forester, one forest grazing inspector, six assistant district foresters, and national forest force.

*Proposed expenditures, 1914-15.*—Washington, \$9,800; districts, \$35,180; forests, \$187,204. \$232,184 (general expenses, \$126,458; statutory, \$105,726). The general expense funds are apportioned among subappropriations as follows: General administration, \$36,600; national forests, \$89,858.

**RANGE INVESTIGATIONS.****Supervision, Inspection, and General Investigations:**

*Object.*—To develop methods of increasing the annual forage crop on national forest ranges and more efficient utilization of this forage crop. The investigations cover improvement of the range by artificial reseedling with cultivated forage plants and by natural reseedling with existing native forage plants; determination of the species, their distribution, main growth requirements, and forage value of the vegetation making up the forage crop, with a view to deciding proper seasons of grazing; adaptability of different ranges to different classes of stock, and the elimination of worthless and poisonous species; the effect of grazing upon tree growth and reproduction; the relation of grazing to erosion and stream flow; and methods of handling different classes of stock under national forest range conditions.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Eight publications on grazing subjects and numerous short articles have been issued. Two bulletins are ready for the press. Material change has been brought about in methods of handling sheep and in methods of securing range revegetation.

*Assignment.*—Office of Grazing Studies.

*Proposed expenditures, 1914-15.*—Washington, \$4,355.

**Artificial Reseeding:**

*Object.*—To determine (1) the lands where seeding to cultivated species of forage plants is economically possible from the range standpoint, as determined by altitude, exposure, soil, moisture, competition with native vegetation, and cost; (2) the species best adapted to any given set of conditions; (3) the best time to sow, and the cultural methods which should be adopted; (4) the necessary protection against grazing; (5) the possibility of growing promising native species under cultivation and securing seed of such species for use in range reseedling.

*Cooperation.*—Office of Economic and Systematic Botany, Bureau of Plant Industry.

*Location.*—Forest experiment stations and national forests.

*Date begun.*—1907.

*Results.*—Approximately 500 tests on 86 forests carried to conclusion, 1908-1913; Department Bulletin No. 4, published. Work on native species initiated 1913 at forest experiment stations.

*Assignment.*—Office of Grazing Studies and forest experiment stations.

*Proposed expenditures, 1914-15.*—\$845.

**Natural Reseeding:**

*Object.*—To determine the important native forage plants, their requirements of growth and reproduction, and with these data as a basis to develop plans of grazing management which will secure natural reseedling of range lands with a minimum loss of forage through nonuse.

*Cooperation.*—Office of Economic and Systematic Botany, Bureau of Plant Industry.

*Location.*—National forests and Utah Experiment Station, Ephraim, Utah.

*Date begun.*—1907.

*Results.*—Experimental work has been conducted for five years in northeastern Oregon, resulting in 4 publications. Rotation system of grazing has been developed and are now advocated for national forest ranges. Present experiments were started on Manti Forest, 1912.

*Assignment.*—Office of Grazing Studies and Utah Experiment Station, Manti Forest.

*Proposed expenditures, 1914-15.*—\$1,000.

**Distribution and Economic Importance of Forage Plants on National Forest Ranges:**

*Object.*—The collection and identification of forage plants on national forest ranges, and accumulation of notes of distribution, growth requirements, and forage value, to serve as the basis of intensive utilization of range with the least interference with requirements of the important forage plants.

*Cooperation.*—Office of Economic and Systematic Botany, Bureau of Plant Industry.

*Location.*—All national forests, district and Washington offices.

*Date begun.*—1907.

*Results.*—Approximately 16,500 specimens collected since August, 1911; notes on approximately 2 000 species have been prepared and furnished to one or more forests. Booklets containing economic notes under preparation for use by forest officers.

*Assignment.*—Collection by all forest officers. Identification by Bureau of Plant Industry. Notes by Office of Grazing Studies.

*Proposed expenditures, 1914-15.*—\$6,000.

**Protection (Grazing):**

*Object.*—To determine the effect of grazing upon tree reproduction, erosion, stream flow, and forest fires, and work out methods of handling the stock which will minimize or eliminate unwarranted damage to grazing.

*Cooperation.*—Office of Economic and Systematic Botany, Bureau of Plant Industry.

*Location.*—National forests.

*Date begun.*—1910.

*Results.*—Four studies have been under way two to four years to determine effect of grazing on reproduction of different important forest trees. Study of grazing and forest fires advanced to preliminary report. Erosion study started in 1912.

*Probable date of completion.*—Present reproduction studies, 1917; erosion studies, 1918 to 1920.

*Assignment.*—Office of Grazing Studies.

*Proposed expenditures, 1914-15.*—\$5,000.

**Methods of Handling Stock on National Forest Ranges:**

*Object.*—To reduce to a minimum the waste of forage in utilizing the range and to minimize cost of efficient handling both to stock owner and Forest Service. The work involves studies to determine the most satisfactory size of band method of herding, salting, watering, lambing, in the case of sheep; and for cattle, methods of control and salting.

*Cooperation.*—Office of Economic and Systematic Botany, Bureau of Plant Industry.

*Location.*—National forests.

*Date begun.*—Summer of 1907.

*Results.*—Four publications issued. Material changes brought about in handling sheep on national forest ranges.

*Assignment.*—Office of Grazing Studies.

*Proposed expenditures, 1914-15.*—\$3,550.

**Methods of Developing Stock Watering Places:**

*Object.*—To determine the most efficient methods of developing water for stock under various conditions on national forest ranges, materials to be used, protection necessary, and capacity of watering place necessary per head of stock.

*Location.*—National forests.

*Date begun.*—1907.

*Results.*—Data secured relative to 700 projects developed up to 1913. Manuscript in press on subject. Special observations under way on water development in lava regions since 1912.

*Assignment.*—Office of Grazing Studies and Modoc Forest.

*Proposed expenditures, 1914-15.*—\$200.

**Poisonous-Plant Investigations:**

*Object.*—To determine what species are poisonous to stock and methods of eradication.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—National forests.

*Date begun.*—1907.

*Results.*—A great many of the most dangerous areas located, fenced, or posted, or poisonous plants dug up. Forest officers and permittees have become more familiar with poisonous species through plant collections and economic notes furnished. (See Bureau of Plant Industry program for specific investigations.)

*Assignment.*—Office of Grazing Studies in cooperation with forest officers and Bureau of Plant Industry.

*Proposed expenditures, 1914-15.*—To Bureau of Plant Industry by cooperation, \$2,100; Forest Service direct, \$1,400.

**Checking Erosion in Mountain Meadows:**

*Object.*—To determine the possibility of constructing small dams in erosion gullies, checking velocity of water and silting up gullies.

*Location.*—Sierra and Kern Forests in California.

*Date begun.*—1911.

*Results.*—One test case started in the Sierra Forest in 1911, and observations made in 1912. The 5 dams were further fortified in 1913 by better chinking and throwing brush behind them for a distance of 20 to 40 feet, with rocks and logs on top, to collect more silt. Water will be turned out at heads of meadows and observations made. A fear has been expressed that ditching around the meadows will result in greater erosion on Sierra on account of the loose character of soil.

*Assignment.*—Sierra National Forest with extension to one project on Kern Forest.

*Proposed expenditures, 1914-15.*—\$250.

**Utilization of Unused Range within National Forests:**

*Object.*—This project will involve the collection of data as to (1) acreage and distribution of national forest land not used for grazing; (2) the portions of this acreage of actual value for grazing; (3) reasons why unused range in each locality are not used; and (4) what development or other work should be done in order to bring about full utilization.

*Location.*—All national forests.

*Date begun.*—Begun as a specific investigation, 1913.

*Results.*—Working plan sent to each forest May, 1913. Reports received, December 1 to January 1, from District 1, all forests; District 2, all forests; District 3, all forests; District 4, 9 forests; District 5, 9 forests; District 6, 8 forests.

*Probable date of completion.*—Main work completed before July 1, 1913; will be carried through 1914 to secure reports from all forests and to formulate plans for utilization.

*Assignment.*—Grazing studies in cooperation with district offices and supervisors.

*Proposed expenditures, 1914-15.*—\$200.

**Climatic Characteristics of Vegetative Belts on the Manti Forest:**

*Object.*—To obtain and correlate exact measurements of climatic factors which limit the distribution of species and bring about distinct plant formations or "vegetative types" locally on the Manti Forest. The following plan of work is proposed: Observations in the oak, aspen, and Engelmann spruce associations at 7,000 feet, 8,700 feet, and 10,000 feet, respectively, under similar conditions of slope and exposure. The following factors will be recorded throughout the season: Air temperatures by thermographs; soil temperatures, 6, 12, and 24 inches deep, read at 8 a. m. and 6 p. m.; soil moisture, 10-day periods, at 6, 12, and 24 inches depths; evaporation (soil and native plants) with special equipment as proposed by Mr. Zon and used at Russian experiment stations.

**Climatic Characteristics of Vegetative Belts on the Manti Forest—Continued.***Cooperation.*—United States Weather Bureau.*Location.*—Manti Forest, Utah.*Date begun.*—1913.*Results.*—Observation stations selected, equipment secured, and part installed.*Assignment.*—Utah Experiment Station.*Proposed expenditures, 1914-15.*—\$100.**Total, Range Investigations,** \$25,000 (general expenses, range investigations).**Total, Grazing,** \$257,184 (general expenses, \$151,458; statutory, \$105,726). The general expense funds are apportioned among subappropriations as follows: General administration, \$36,600; national forests, \$89,858; range investigations, \$25,000.**LANDS.**

(JAMES B. ADAMS, Assistant Forester, in charge.)

**Administration:***Object.*—General supervision of all matters relating to the application of the public land laws to land within national forests, and the uses of national forest lands for purposes other than timber sales and grazing. This branch includes activities relating to boundary examinations, claims, administrative sites, settlement, special uses and rights of way, water power, occupancy trespass, land classification, land exchange, and entry surveys.*Cooperation.*—General Land Office, Geological Survey, Reclamation Service, Office of Indian Affairs.*Location.*—Washington, D. C., and district headquarters.*Date begun.*—Lands was organized as a separate branch in 1907.*Assignment.*—Assistant Forester, Chief of Branch, assistant district forester.*Proposed expenditures, 1914-15.*—Washington, \$6,500; districts, \$21,885.**Boundary Examination:***Object.*—Revision and correction of forest boundaries.*Cooperation.*—Department of the Interior.*Location.*—Washington, D. C., district headquarters, and national forests.*Date begun.*—1897.*Results.*—In the main the boundaries of the national forests may be said to be reasonably permanent. The lines have been carefully drawn to include, so far as practicable, only those lands which upon examination have been found to be valuable for timber or watershed protection purposes. Any change in the future will consist more or less of isolated instances in which more detailed information shows that the lines of the forests may be more closely drawn without detriment to the forest unit and at the same time exclude lands which have a higher value for agriculture or for other than forest purposes.*Assignment.*—Forest examiners and national forest force.*Proposed expenditures, 1914-15.*—Washington, \$2,700; districts, \$4,927; forests, \$8,715.**Claims:***Object.*—The investigation of all matter relative to claims to land within the national forests under the public land laws.*Cooperation.*—Office of the solicitor.*Location.*—Washington, D. C., district headquarters, and national forests.*Date begun.*—1897.*Results.*—There has been accomplished a gradual reduction in the number of invalid and fraudulent claims in the national forests. During 1913, 1,690 individual tracts of land in the national forests passed into private ownership through the patenting of claims, and 565 entries of all descriptions were canceled by the General Land Office, the great majority representing proceedings to clear the records of abandoned entries.*Assignment.*—Forest examiners and national forest force, including expert miners.*Proposed expenditures, 1914-15.*—Washington, \$3,520; districts, \$24,011; forests, \$23,008.**Administrative Sites:***Object.*—Selection (posting and withdrawal) of areas within the national forests for administrative use, ranger stations, banking grounds, nursery sites, etc.*Cooperation.*—General Land Office.*Location.*—District offices and national forests.

**Administrative Sites—Continued.**

*Date begun.*—1906.

*Results.*—Withdrawal and posting of new sites; reexamining former established sites, and releasing in whole or in part such as appear no longer required or not required in the future.

*Assignment.*—Forest examiners and national forest force.

*Proposed expenditures, 1914-15.*—Districts, \$1,024; forests, \$7,670.

**Settlement:**

*Object.*—To assist bona fide applicants in securing title to homesteads within the national forests under the act of June 11, 1906.

*Cooperation.*—General Land Office.

*Location.*—Washington, D. C., district headquarters, and national forests.

*Date begun.*—June 11, 1906.

*Results.*—Since the passage of the forest homestead act of June 11, 1906, there have been listed for entry 13,061 individual tracts, with an area of over 1,400,000 acres.

*Assignment.*—Forest examiners and national forest force.

*Proposed expenditures, 1914-15.*—Washington, \$6,660; districts, \$44,851; forests, \$104,932.

**Special Uses and Rights of Way:**

*Object.*—The granting of permits for the use of any piece of land for such special purposes as hotel sites, county roads, trolleys, railroads, telephone lines, and residences. In connection with the granting of permits for special uses, particularly for recreation purposes, it is planned to inaugurate a system of sanitary regulations for the protection of the health of the communities which use water from areas in demand for camping purposes. To this end close cooperation with cities and towns whose interests are involved will be sought.

*Cooperation.*—General Land Office.

*Location.*—Washington, D. C., district headquarters, and national forests.

*Date begun.*—1898.

*Results.*—At the close of 1913 there were 15,649 permits in effect authorizing the occupancy of small areas of land for miscellaneous uses.

*Assignment.*—Forest examiners and national forest force.

*Proposed expenditures, 1914-15.*—Districts, \$2,819; forests, \$21,265.

**Engineering—Water Power:**

*Object.*—Investigations in connection with the development of the water resources of the national forests for power, irrigation, and municipal purposes; the handling of applications and permits for water-power projects and transmission lines; assistance in road, trail, bridge, and telephone construction, log driving, stream gaging, railroad location and construction.

*Cooperation.*—Department of the Interior, States and counties in which forests are located, municipalities, and individuals.

*Location.*—Washington, D. C., districts, and national forests.

*Date begun.*—1896.

*Results.*—On November 1, 1913, 174 permits were in effect for water-power projects and 95 permits for transmission lines. Total power capacity of projects under permit, 980,233 horsepower, an increase of 196,623 horsepower since July 1, 1913. Total mileage of transmission lines, 610.8. The present value of roads, trails, and other lines of communication and protection on national forests is estimated at more than \$2,000,000, or approximately 65 per cent of the total improvements of all kinds.

*Assignment.*—Chief engineer, district engineers, and forest force.

*Proposed expenditures, 1914-15.*—Washington, \$12,700; districts, \$10,581; forests, \$1,743.

**Occupancy Trespass:**

*Object.*—The handling of cases of illegal occupancy of national forest land by squatters for residences, hotels, water-power sites, etc.

*Cooperation.*—Solicitor's office.

*Location.*—District headquarters and national forests.

*Date begun.*—1897.

*Results.*—The number of these cases is decreasing as the public comes to understand the regulations of the department respecting the occupancy of forest lands.

*Assignment.*—Forest examiners and national forest force.

*Proposed expenditures, 1914-15.*—Districts, \$352; forests, \$1,046.

**Land Classification:**

*Object.*—The classification and segregation of lands within the national forests that may be opened to settlement and entry under the homestead laws applicable to the national forests; also the designation and segregation of all lands required permanently for national forest purposes.

*Cooperation.*—Department of the Interior.

*Location.*—Washington, D. C., district and national forest headquarters.

*Date begun.*—August 10, 1912.

*Results.*—To date about 12,000,000 acres have been covered by classification. The lands found to be "chiefly valuable for agriculture" have been either listed and made available for entry under the forest homestead act of June 11, 1906, or eliminated from the national forests and made available under the public land laws.

*Probable date of completion.*—Approximately five years hence.

*Assignment.*—Forest examiners and national forest force.

*Proposed expenditures, 1914-15.*—Washington, \$1,000; districts, \$92,000.

**Land Exchange:**

*Object.*—Locating, surveying, appraising, etc., State and private lands proposed for exchange for Government lands; also locating, etc., Government lands selected for the exchange. The consolidation of the scattered holdings within the national forests will be of advantage in overcoming serious difficulties of administration and management that have been encountered by reason of these scattered holdings.

*Cooperation.*—Department of the Interior.

*Location.*—District headquarters and national forests.

*Date begun.*—First State exchange agreement, January 4, 1910.

*Results.*—The examinations of unsurveyed State school sections within the national forests of South Dakota and Idaho, affecting 63,000 and 548,157 acres, respectively, have been completed, and the States authorized to select other lands in exchange. The examination of lands for exchange with the State of Montana, involving 766,000 acres, is still under way. An exchange of lands with the State of Michigan has also been authorized by act of Congress, July 31, 1912, and an examination of the State and national forest lands is in progress. Negotiations are under way contemplating agreements of exchange with the States of Oregon and Washington.

*Assignment.*—Forest examiners.

*Proposed expenditures, 1914-15.*—Districts, \$13,000.

**Entry Survey:**

*Object.*—The final survey for patent of homesteads on the national forests initiated under act of June 11, 1906, and the act of March 3, 1899.

*Cooperation.*—Division E of the General Land Office; surveyor general in the West.

*Location.*—Washington, D. C., and district headquarters.

*Date begun.*—July, 1913.

*Results.*—Since beginning field work above, 400 cases have been surveyed by the 20 parties in the field. Three hundred sets of returns have been transmitted to the Surveyor General for approval, of which over 150 are now at the General Land Office awaiting acceptance by the commission.

*Probable date of completion.*—Will continue for several years.

*Assignment.*—Forest examiners and surveyors.

*Proposed expenditures, 1914-15.*—Washington, \$7,100; districts, \$80,000.

**Total, Lands, \$504,009** (general expenses, \$333,472; statutory, \$157,537; land exchange, Montana, \$13,000). The general expense funds are apportioned among subappropriations as follows: General administration, \$74,650; land classification, \$93,000; survey, \$85,000; national forests, \$80,822.

**APPALACHIAN.**

(WM. L. HALL, Assistant Forester, in charge.)

**Acquisition of Lands under the Weeks Law:**

*Object.*—To purchase lands for the protection of watersheds of navigable streams under the Weeks law.

*Cooperation.*—Geological Survey and Solicitor of the department.

*Location.*—Washington, D. C.

*Date begun.*—March, 1912.

**Acquisition of Lands under the Weeks Law—Continued.**

*Results.*—Examined and approved for purchase, 1,060,000 acres.

*Probable date of completion.*—About 1916.

*Assignment.*—Assistant Forester, in charge of acquisition.

*Proposed expenditures 1914-15.*—About \$2,005,500 (statutory, \$5,500; acquisition of lands, etc., \$2,000,000).<sup>1</sup>

**SUMMARY OF ALLOTMENTS BY FORESTS.**

Total proposed expenditures (including \$21,500 statutory, Secretary's roll, but not including \$213,773 unallotted), \$7,942,183.

To be expended approximately as follows:

**Washington, D. C.:**

|  |                    |
|--|--------------------|
| General office and field work.....     | \$462, 090         |
| Madison laboratory.....                | 126, 780           |
| Appalachian purchase.....              | 2, 005, 500        |
| State cooperative fire protection..... | 108, 900           |
| <b>Total.....</b>                      | <b>2, 703, 270</b> |

**District 1—Missoula, Mont.:**

|                                  |          |
|----------------------------------|----------|
| District—Office and field.....   | 153, 843 |
| Absaroka National Forest.....    | 20, 875  |
| Beartooth.....                   | 15, 144  |
| Beaverhead.....                  | 19, 520  |
| Bitterroot.....                  | 26, 040  |
| Blackfeet.....                   | 41, 446  |
| Cabinet.....                     | 20, 270  |
| Clearwater.....                  | 26, 095  |
| Coeur d'Alene.....               | 53, 583  |
| Custer.....                      | 11, 520  |
| Dakota.....                      | 1, 395   |
| Deerlodge.....                   | 37, 991  |
| Flathead.....                    | 40, 889  |
| Gallatin.....                    | 16, 996  |
| Helena.....                      | 19, 735  |
| Jefferson.....                   | 22, 317  |
| Kaniksu.....                     | 35, 677  |
| Kootenai.....                    | 41, 042  |
| Lewis and Clark.....             | 18, 730  |
| Lolo.....                        | 34, 780  |
| Madison.....                     | 20, 339  |
| Missoula.....                    | 24, 073  |
| Nezperce.....                    | 26, 352  |
| Pend Oreille.....                | 29, 635  |
| St. Joe.....                     | 39, 377  |
| Selway.....                      | 29, 459  |
| Sioux.....                       | 10, 525  |
| Planting fund.....               | 45, 000  |
| Roads and trails for States..... | 62, 400  |
| Fire fund.....                   | 25, 000  |
| Montana Land Exchange.....       | 13, 000  |
| Forest contingent.....           | 11, 900  |

**Total.....** 994, 948

**District 2—Denver, Colo.:**

|                                |          |
|--------------------------------|----------|
| District—Office and field..... | 128, 245 |
| Arapaho National Forest.....   | 19, 425  |
| Battlement.....                | 16, 495  |
| Bighorn.....                   | 27, 699  |
| Black Hills.....               | 28, 223  |

**District 2—Denver, Colo.—Continued.**

|                                  |           |
|----------------------------------|-----------|
| Bonneville.....                  | \$15, 776 |
| Bridger.....                     | 10, 651   |
| Cochetopa.....                   | 17, 465   |
| Colorado.....                    | 16, 868   |
| Durango.....                     | 19, 032   |
| Gunnison.....                    | 19, 183   |
| Harney.....                      | 28, 035   |
| Hayden.....                      | 19, 560   |
| Holy Cross.....                  | 17, 603   |
| Kansas.....                      | 4, 215    |
| Leadville.....                   | 19, 015   |
| Marquette.....                   | 142       |
| Medicine Bow.....                | 16, 750   |
| Michigan.....                    | 10, 118   |
| Minnesota.....                   | 14, 015   |
| Montezuma.....                   | 16, 508   |
| Nebraska.....                    | 6, 230    |
| Pike.....                        | 29, 046   |
| Rio Grande.....                  | 23, 835   |
| Routt.....                       | 21, 455   |
| San Isabel.....                  | 16, 562   |
| San Juan.....                    | 18, 542   |
| Shoshone.....                    | 19, 925   |
| Sopris.....                      | 20, 301   |
| Sundance.....                    | 4, 968    |
| Superior.....                    | 20, 242   |
| Uncompahgre.....                 | 24, 672   |
| Washakie.....                    | 9, 318    |
| White River.....                 | 20, 542   |
| Planting fund.....               | 38, 000   |
| Roads and trails for States..... | 59, 000   |
| Fire fund.....                   | 10, 000   |
| Forest contingent.....           | 5, 476    |

**Total.....** 813, 137

**District 3—Albuquerque, N. Mex.:**

|                                |          |
|--------------------------------|----------|
| District—Office and field..... | 139, 604 |
| Alamo National Forest.....     | 13, 596  |
| Apache.....                    | 28, 017  |
| Carson.....                    | 26, 935  |
| Chiricahua.....                | 12, 970  |
| Coconino.....                  | 31, 742  |
| Coronado.....                  | 18, 275  |
| Crook.....                     | 14, 835  |
| Datil.....                     | 30, 360  |
| Gila.....                      | 34, 042  |
| Jemez.....                     | 18, 652  |
| Lincoln.....                   | 15, 000  |

<sup>1</sup> Includes \$60,000 allotted to office of Secretary (Solicitor's office).

## District 3—Albuquerque, N. Mex.—Continued.

|                                  |           |
|----------------------------------|-----------|
| Manzano.....                     | \$16, 195 |
| Pecos.....                       | 23, 657   |
| Prescott.....                    | 22, 225   |
| Sitgreaves.....                  | 20, 636   |
| Tonto.....                       | 20, 605   |
| Tusayan.....                     | 29, 161   |
| Wichita.....                     | 5, 634    |
| Planting fund.....               | 6, 985    |
| Roads and trails for States..... | 56, 000   |
| Fire fund.....                   | 10, 000   |
| Forest contingent.....           | 9, 598    |
| Total.....                       | 604, 724  |

## District 4—Ogden, Utah:

|  |          |
|--|----------|
| District—Office and field.....               | 113, 225 |
| Ashley National Forest.....                  | 15, 056  |
| Boise.....                                   | 23, 628  |
| Cache—Pocatello.....                         | 28, 681  |
| Caribou.....                                 | 20, 060  |
| Challis.....                                 | 17, 133  |
| Dixie.....                                   | 14, 370  |
| Fillmore.....                                | 18, 413  |
| Fishlake.....                                | 17, 214  |
| Humboldt.....                                | 11, 715  |
| Idaho.....                                   | 19, 140  |
| Kaibab.....                                  | 9, 138   |
| La Sal.....                                  | 14, 438  |
| Lemhi.....                                   | 19, 161  |
| Manti.....                                   | 29, 331  |
| Minidoka.....                                | 13, 708  |
| Moapa.....                                   | 600      |
| Nebo (see Uinta).....                        |          |
| Nevada.....                                  | 16, 157  |
| Palisade.....                                | 19, 165  |
| Payette.....                                 | 34, 275  |
| Pocatello (see Cache).....                   |          |
| Powell.....                                  | 12, 185  |
| Ruby.....                                    | 8, 065   |
| Salmon.....                                  | 27, 300  |
| Santa Rosa.....                              | 9, 113   |
| Sawtooth.....                                | 21, 233  |
| Sevier.....                                  | 15, 975  |
| Targhee.....                                 | 21, 948  |
| Teton.....                                   | 15, 113  |
| Toiyabe.....                                 | 10, 910  |
| Uinta—Nebo.....                              | 17, 913  |
| Wasatch.....                                 | 25, 140  |
| Weiser.....                                  | 21, 625  |
| Wyoming.....                                 | 20, 969  |
| Supply depot, Ogden, and property audit..... | 132, 620 |
| Planting fund.....                           | 11, 300  |
| Roads and trails for States.....             | 72, 000  |
| Fire fund.....                               | 10, 000  |
| Forest contingent.....                       | 800      |
| Total.....                                   | 908, 817 |

## District 5—San Francisco, Cal.:

|                                |          |
|--------------------------------|----------|
| District—Office and field..... | 149, 357 |
| Angeles National Forest.....   | 43, 865  |
| California.....                | 37, 001  |
| Cleveland.....                 | 27, 929  |
| Eldorado.....                  | 23, 581  |

## District 5—San Francisco, Cal.—Continued.

|                                  |           |
|----------------------------------|-----------|
| Inyo.....                        | \$12, 686 |
| Kern (see Sequoia).....          |           |
| Klamath.....                     | 40, 261   |
| Lassen.....                      | 31, 164   |
| Modoc.....                       | 19, 693   |
| Mono.....                        | 11, 166   |
| Monterey.....                    | 7, 635    |
| Plumas.....                      | 45, 007   |
| Santa Barbara.....               | 39, 437   |
| Sequoia—Kern.....                | 48, 622   |
| Shasta.....                      | 40, 608   |
| Sierra.....                      | 44, 697   |
| Stanislaus.....                  | 36, 235   |
| Tahoe.....                       | 37, 140   |
| Trinity.....                     | 37, 658   |
| Planting fund.....               | 4, 312    |
| Roads and trails for States..... | 44, 000   |
| Fire fund.....                   | 25, 000   |
| Forest contingent.....           | 13, 977   |
| Total.....                       | 821, 031  |

## District 6—Portland, Oreg.:

|                                  |          |
|----------------------------------|----------|
| District—Office and field.....   | 148, 102 |
| Cascade National Forest.....     | 25, 735  |
| Chelan.....                      | 14, 722  |
| Chugach.....                     | 15, 600  |
| Columbia.....                    | 22, 680  |
| Colville.....                    | 17, 907  |
| Crater.....                      | 31, 007  |
| Deschutes.....                   | 15, 983  |
| Fremont.....                     | 20, 179  |
| Malheur.....                     | 19, 033  |
| Minam.....                       | 14, 215  |
| Ochoco.....                      | 18, 308  |
| Okanogan.....                    | 22, 960  |
| Olympic.....                     | 40, 020  |
| Oregon.....                      | 46, 781  |
| Paulina.....                     | 7, 969   |
| Rainier.....                     | 30, 746  |
| Santiam.....                     | 27, 812  |
| Siskiyou.....                    | 29, 487  |
| Siuslaw.....                     | 22, 356  |
| Snoqualmie.....                  | 34, 505  |
| Tongass.....                     | 27, 700  |
| Umatilla.....                    | 13, 874  |
| Umpqua.....                      | 26, 061  |
| Wallowa.....                     | 25, 247  |
| Washington.....                  | 22, 016  |
| Wenaha.....                      | 14, 204  |
| Wenatchee.....                   | 24, 032  |
| Whitman.....                     | 26, 500  |
| Planting fund.....               | 13, 500  |
| Roads and trails for States..... | 66, 000  |
| Fire fund.....                   | 15, 000  |
| Fire contingent.....             | 5, 400   |
| Total.....                       | 905, 641 |

## District 7—Washington, D. C.:

|                                |         |
|--------------------------------|---------|
| District—Office and field..... | 14, 820 |
| Arkansas National Forest.....  | 28, 380 |
| Florida.....                   | 14, 731 |
| Luquillo.....                  | 5, 000  |
| Ozark.....                     | 26, 364 |

District 7—Washington, D.  
C.—Continued.

## New forest areas—

|                     |         |
|---------------------|---------|
| Cherokee.....       | \$3,900 |
| Georgia.....        | 4,220   |
| Massanutten.....    | 4,340   |
| Monongahela.....    | 3,050   |
| Mt. Mitchell.....   | 4,480   |
| Nantahala.....      | 3,500   |
| Natural Bridge..... | 4,910   |
| Pisgah.....         | 5,000   |
| Potomac.....        | 3,150   |
| Savannah North..... | 2,900   |
| Savannah South..... | 3,800   |

District 7—Washington, D.  
C.—Continued.

## New forest areas—Con.

|                                  |         |
|----------------------------------|---------|
| Shenandoah.....                  | \$4,540 |
| Smoky Mountains.....             | 3,720   |
| Unaka.....                       | 2,800   |
| White Mountains.....             | 6,190   |
| White Top.....                   | 3,520   |
| Roads and trails for States..... | 8,600   |
| Fire fund.....                   | 5,000   |
| Fire contingent.....             | 23,700  |
| Total.....                       | 190,615 |

## FOREST SERVICE—SUMMARY OF APPROPRIATIONS.

| Appropriations.                          | Allotted.              | Unallotted<br>(contingent). | Total.                 |
|--|------------------------|-----------------------------|------------------------|
| <b>Statutory:</b>                        |                        |                             |                        |
| Forest Service.....                      | \$2,299,860            | \$5,300                     | \$2,305,160            |
| Secretary's office.....                  | 21,500                 |                             | 21,500                 |
| <b>General expenses:</b>                 |                        |                             |                        |
| Land classification.....                 | 93,000                 | 7,000                       | 100,000                |
| Surveys.....                             | 85,000                 |                             | 85,000                 |
| Fighting forest fires.....               | 100,000                | 50,000                      | 150,000                |
| Maintenance and supplies.....            | 160,000                |                             | 160,000                |
| Forest products.....                     | 138,680                | 1,320                       | 140,000                |
| Range investigations.....                | 25,000                 |                             | 25,000                 |
| Tree planting.....                       | 164,625                | 1,015                       | 165,640                |
| Silvical investigations.....             | 81,200                 | 2,528                       | 83,728                 |
| Miscellaneous forest investigations..... | 38,620                 | 1,540                       | 40,160                 |
| Improvements.....                        | <sup>1</sup> 392,000   |                             | <sup>1</sup> 400,000   |
| National forests.....                    | <sup>2</sup> 1,408,952 | 5,000                       | <sup>2</sup> 1,893,568 |
| General administration.....              | 449,746                | 37,870                      | <sup>3</sup> 487,616   |
|  | <sup>4</sup> 5,458,183 | 111,573                     | <sup>4</sup> 5,569,756 |
| <b>Special:</b>                          |                        |                             |                        |
| Extraordinary fire.....                  |                        | 100,000                     | 100,000                |
| Cooperative fire protection.....         | 102,200                |                             | 102,200                |
| Roads and trails.....                    | 368,000                |                             | 368,000                |
|  | (estimated).           |                             | (estimated).           |
| Cooperative work.....                    | 800                    | 20,000                      | 20,800                 |
|  |                        | (estimated).                | (estimated).           |
| Montana exchange.....                    | 13,000                 |                             | 13,000                 |
| Acquisition of lands.....                | 2,000,000              |                             | 2,000,000              |
| Total.....                               | <sup>4</sup> 7,942,183 | 231,573                     | <sup>4</sup> 8,173,756 |

<sup>1</sup> \$8,000 for general administration.<sup>2</sup> \$479,616 for general administration.<sup>3</sup> Includes \$479,616 from national forests and \$8,000 from improvements.<sup>4</sup> Includes \$21,500 statutory salaries (law), Secretary's Office.

## BUREAU OF CHEMISTRY.

## GENERAL BUREAU ADMINISTRATION.

## Office of Chief:

*Object.*—General administration of the research, regulatory, and business affairs of the bureau.*Cooperation.*—Other bureaus of the department.*Location.*—Washington, D. C.*Date begun.*—1902.*Assignment.*—C. L. Alsberg, H. F. Fitts, and H. M. Bain.*Proposed expenditures, 1914-15.*—\$14,740 (food and drugs, \$5,600; statutory, \$9,140).

## Office of Assistant Chief:

*Object.*—To assist chief in bureau administration.*Location.*—Washington, D. C.*Date begun.*—1914.*Assignment.*—R. L. Emerson, A. S. Mitchell, and S. H. Ross.*Proposed expenditures, 1914-15.*—\$18,480 (food and drugs, \$10,820; statutory, \$7,660).

**Office of Chief Clerk:***Object.*—To supervise clerical work of the bureau.*Location.*—Washington, D. C.*Date begun.*—1902.*Assignment.*—F. B. Linton.*Proposed expenditures, 1914-15.*—\$6,000 (food and drugs, \$700; statutory, \$5,300).**Accounts Section:***Object.*—Supervision and maintenance of financial records of the bureau.*Location.*—Washington, D. C.*Date begun.*—1902.*Assignment.*—J. G. Coleman.*Proposed expenditures, 1914-15.*—\$9,500 (food and drugs, \$2,700; statutory, \$6,800).**Supply Section:***Object.*—Purchase, receipt, maintenance, and distribution of supplies.*Location.*—Washington, D. C.*Date begun.*—1914.*Assignment.*—S. A. Postle.*Proposed expenditures, 1914-15.*—\$13,620 (food and drugs, \$3,600; statutory, \$10,020).**Mail and Files Section:***Object.*—Handling and filing incoming and outgoing mail, and messenger work.*Location.*—Washington, D. C.*Date begun.*—1907.*Assignment.*—P. Perrone.*Proposed expenditures, 1914-15.*—\$9,000 (food and drugs, \$980; statutory, \$8,020).**Editorial Section:***Object.*—Preparation of manuscripts for publication.*Cooperation.*—Division of Publications.*Location.*—Washington, D. C.*Date begun.*—1902.*Assignment.*—G. O. Savage.*Proposed expenditures, 1914-15.*—\$3,300 (food and drugs, \$1,260; statutory, \$2,040).**Library:***Object.*—Indexing and distribution of publications.*Cooperation.*—Department Library.*Location.*—Washington, D. C.*Date begun.*—1902.*Assignment.*—A. E. Draper.*Proposed expenditures, 1914-15.*—\$5,420 (food and drugs, \$400; statutory, \$5,020).**Total, General Bureau Administration,** \$80,060 (food and drugs, \$26,060; statutory, \$54,000).**INVESTIGATIONS IN AGRICULTURAL CHEMISTRY.****PLANT BIOCHEMICAL STUDIES.****Chemistry of Plant Growth:****(a) INFLUENCE ON GROWTH AND COMPOSITION OF AN EARLY APPLICATION OF PLANT FOOD—***Object.*—To determine the necessity for an early application of fertilizers.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C., Arlington, Va., and possibly some western experiment stations of the Bureau of Plant Industry.*Date begun.*—1914.*Results.*—Work started at Minneapolis but abandoned on account of cold weather; work with seedlings carried on at Mandan, N. Dak.*Probable date of completion.*—1916.*Assignment.*—J. F. Breazeale.*Proposed expenditures, 1914-15.*—\$940.**(b) CHANGES IN PLANTS DURING NORMAL GROWTH—***Object.*—To determine chemical and physiological changes taking place in plants during the growing period.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C.*Date begun.*—1909.*Assignment.*—J. F. Breazeale, L. H. Bailey.*Proposed expenditures, 1914-15.*—\$500.

**Chemistry of Plant Growth—Continued.****(c) CHANGES IN GROWING PLANTS UNDER CONTROLLED CHEMICAL AND PHYSICAL TREATMENT—**

*Object.*—To study the effect of recognized plant food constituents and other inorganic elements; also the effect of sunlight and colored light on plant growth.

The object will be to follow changes during growth of plants, the metabolism of phosphoric acid and nitrogen, formation of sugars, pentosans, etc.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Several experiments have been performed, but work has been hampered on account of lack of necessary greenhouse space.

*Assignment.*—J. F. Breazeale.

*Proposed expenditures, 1914-15.*—\$800.

**Influence of Environment on Crops and Plants:****(a) INFLUENCE OF ENVIRONMENT ON THE COMPOSITION OF GRAINS—**

*Object.*—To determine what rôle is played by the composition of the seed and the effect of environment on the composition of the crop.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Chemistry Bulletin 128 covers first three years of work; a report of results obtained up to 1913 published in Journal of Agricultural Research, vol. 1, No. 4; a second bulletin being prepared.

*Assignment.*—J. A. Le Clerc, J. Davidson.

*Proposed expenditures, 1914-15.*—\$1,100.

**(b) INFLUENCE OF SOIL AND CLIMATE ON PLANT COMPOSITION—**

*Object.*—To determine what influence on the composition of plants may be attributed to climatic agencies and to soil.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Result of first four years' work published in Journal of Agricultural Research; sufficient data on hand on wheat, oats, barley, kafir, and flax to warrant publication.

*Assignment.*—J. A. Le Clerc, J. Davidson.

*Proposed expenditures, 1914-15.*—\$1,000.

**(c) INFLUENCE OF ENVIRONMENT ON THE COMPOSITION OF PLANTS OTHER THAN GRAINS—**

*Object.*—To obtain data regarding the effect of various environmental factors on the characteristics of plants.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Much data at hand and publication being prepared.

*Assignment.*—J. A. Le Clerc, L. H. Bailey.

*Proposed expenditures, 1914-15.*—\$500.

**(d) INFLUENCE OF DIFFERENT SOILS ON THE COMPOSITION OF WHEAT—**

*Object.*—To determine the influence of soils, in contradistinction to other environmental agencies, on composition of wheat.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—J. A. Le Clerc, L. H. Bailey.

*Proposed expenditures, 1914-15.*—\$634.

**(e) STUDY OF THE CHEMISTRY OF GRAINS TYPICAL OF THE DIFFERENT STATES—**

*Object.*—To obtain more thorough knowledge of the quality of grains grown in the different States.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Many samples from States west of the Mississippi analyzed; samples from States east of the Mississippi to be investigated; several samples 5 to 6 years old have been investigated.

*Assignment.*—J. A. Le Clerc, L. H. Bailey.

*Proposed expenditures, 1914-15.*—\$300.

**Influence of Environment on Crops and Plants—Continued.****(f) CHANGES IN COMPOSITION WHICH GRAINS UNDERGO DURING STORAGE—**

*Object.*—To determine chemical and physical changes taking place in cereals during storage.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Assignment.*—J. Davidson.

*Proposed expenditures, 1914-15.*—\$100.

**(g) INFLUENCE OF STACKING AND SHOCKING WHEAT ON THE QUALITY OF FLOUR AND THE BREAD MADE THEREFROM—**

*Object.*—To note the effect that the stacking and shocking of wheat have on the quality of the flour. This study may have an important bearing in explaining the differences in qualities of wheat grown in the West, where some wheats are stacked and others are harvested by the use of headers.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Results from experiments with two samples of wheat are at hand.

*Assignment.*—M. G. Mastin, H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$350.

**(h) VALUE OF LEAVES OF DIFFERENT SPECIES FOR MANURIAL PURPOSES—**

*Object.*—To obtain data showing value of leaves for manurial purposes.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—No work has been done on this project during the past year although many data are at hand from previous work.

*Assignment.*—J. F. Breazeale, L. H. Bailey.

*Proposed expenditures, 1914-15.*—\$150.

**(i) LOSS OF PLANT CONSTITUENTS IN HAY AND OTHER PLANTS WHEN SUBJECTED TO RAIN—**

*Object.*—To determine the amount of plant food and other constituents which may be removed from plants by the action of rain. The knowledge thus obtained will be of benefit in subsequent plat and pot experiments which may be instituted in order to determine the amount of food required by plants, and will show the necessity of more careful curing of hay.

*Cooperation.*—Maryland Experiment Station and Arlington, Va.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Considerable work with hays; preliminary paper presented before American Chemical Society at Rochester, 1913; Yearbook article, 1908, showing to what extent inorganic constituents of oat and wheat plants were removed by leaching.

*Probable date of completion.*—1916.

*Assignment.*—J. A. Le Clerc, J. F. Breazeale.

*Proposed expenditures, 1914-15.*—\$600.

**Studies of Mill Products:****(a) WHEAT AND WHEAT PRODUCTS—**

*Object.*—To determine methods for the valuation of wheat and flour, bread, macaroni; effect of various factors on quality of flour and prepared products; and composition of wheat, flour, bread, breakfast food, macaroni.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Many data accumulated.

*Assignment.*—M. G. Mastin, H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$1,000.

**(b) RICE AND RICE PRODUCTS—**

*Object.*—To obtain knowledge regarding the composition of paddy, hulled and polished rice, and various mill products of the same.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Two sets of samples of rice and rice mill products have been obtained from two different mills and are being analyzed and studied.

*Assignment.*—J. A. Le Clerc, L. H. Bailey.

*Proposed expenditures, 1914-15.*—\$350.

**Studies of Mill Products—Continued.****(c) COMPARISON OF SEMOLINA AND THE WHEAT FROM WHICH PRODUCED—**

*Object.*—To compare the semolina used in the manufacture of imported and domestic macaroni and the kind of wheat used in the production of the semolina, with a view to obtaining data which may be used in encouraging the manufacture of a larger amount of macaroni from the best grades of semolina.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—J. A. Le Clerc, M. G. Mastin.

*Proposed expenditures, 1914-15.*—\$1,000.

**(d) INFLUENCE OF CARBON DIOXID ON THE KEEPING QUALITY AND CHARACTERISTICS OF FLOUR—**

*Object.*—To obtain data regarding the influence of carbon dioxide on the life of weevils and other insects and on the baking qualities of flour.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$350.

**(e) INFLUENCE OF VACUUM ON THE CHARACTERISTICS OF GLUTEN AND THE KEEPING QUALITY OF FLOUR—**

*Object.*—To obtain data regarding the influence of lack of oxygen on the life of weevils and other insects affecting flour and on the characteristics of the gluten and baking qualities of the flour.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$350.

**(f) INFLUENCE OF DRYING FLOUR IN VACUUM ON ITS KEEPING QUALITY AND ON THE CHARACTERISTICS OF THE GLUTEN—**

*Object.*—To determine what influence drying flour in vacuum at different temperatures has on the life of weevils and other insects and on the baking quality of the flour.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$350.

**Studies in Bread Making:**

*Object.*—To study the methods of using soft winter-wheat flour, malt extracts, yeasts, and other aids in baking.

*Cooperation.*—French bakers in some of our large cities.

*Location.*—Washington, D. C., and certain cities where French bakers are to be found.

*Date begun.*—July, 1914.

*Probable date of completion.*—1916.

*Assignment.*—H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$1,500.

**Flour Substitutes:**

*Object.*—To study the adaptability for baking of flour containing such substances as chestnut, banana, peanut, soy bean, peas, corn, barley, oats, rye, kafir, dasheen, etc.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Considerable work has been done, and results are almost ready to be reported.

*Probable date of completion.*—1915.

*Assignment.*—H. L. Wessling.

*Proposed expenditures, 1914-15.*—\$500.

**Malting:**

*Object.*—To determine the quality of malt obtained from different kinds of barley malted under different conditions.

*Location.*—Washington, D. C.

*Date begun.*—1905.

**Malting—Continued.**

*Results.*—Considerable work has been done, and Bureau of Chemistry Bulletin 124 published on barleys and malts; a short report on malting published in Bulletin 130.

*Assignment.*—J. A. Le Clerc.

*Proposed expenditures, 1914-15.*—\$500.

**Miscellaneous Analyses:**

*Object.*—To conduct routine analyses for the purpose of obtaining information regarding the composition of various plants and plant products.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—J. A. Le Clerc and assistants.

*Proposed expenditures, 1914-15.*—\$6,526.

**Total, Plant Biochemical Studies,** \$20,000 (general expenses, \$14,480; food and drugs, \$3,000; statutory, \$2,520<sup>1</sup>).

**TECHNOLOGICAL INVESTIGATIONS.****Paper Investigations:****(a) INVESTIGATIONS ON THE DURABILITY OF PAPER—**

*Object.*—To study the factors involved in the making of durable paper; to formulate specifications for papers suitable for permanent records.

*Cooperation.*—Paper makers, courts, libraries, and other users of record papers.

*Location.*—Washington, D. C.

*Date begun.*—Cursorily, 1906; definitely, 1912.

*Results.*—First stages of work completed; effect of humidity on durability shown.

*Assignment.*—C. F. Sammet and F. P. Veitch.

*Proposed expenditures, 1914-15.*—\$2,250.

**(b) INVESTIGATIONS OF DISTINCTIVE PAPERS—**

*Object.*—To devise a money paper that can not be counterfeited, that will be more serviceable than existing sorts and can be washed without injury, and that will give more individuality to bills of different denominations.

*Cooperation.*—Bureau of Engraving and Printing, Bureau of Standards, paper makers, and bankers.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—This project is conducted by a joint committee of the Bureau of Chemistry and the Bureau of Standards. The adoption of a suggestion of this committee has resulted in a saving of \$12,300 per annum to the Treasury Department.

*Probable date of completion.*—December, 1915.

*Assignment.*—F. P. Veitch, C. F. Sammet, and F. C. Clark (Bureau of Standards).

*Proposed expenditures, 1914-15.*—\$600.

**Leather and Tanning Investigations:****(a) INVESTIGATION OF THE WEARING QUALITY OF SOLE LEATHER.**

*Object.*—To determine the effect of the various tanning processes on the wearing quality; to determine the wearing quality of various tannages; to determine the relative value of leather made from different sections of the hide.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—A machine for testing wearing quality has been designed and is being built but is not completely equipped; preliminary experiments completed; different leathers used for soling analyzed and data in shape for correlation with the machine demonstration of the wearing qualities of leathers.

*Assignment.*—J. S. Rogers.

*Proposed expenditures, 1914-15.*—\$1,200.

<sup>1</sup> With the exception of "General Bureau Administration," statutory salaries are shown only by main project groups. To arrive at the actual expenditures proposed for each subactivity under a group the statutory funds would need to be prorated.

**Leather and Tanning Investigations—Continued.****(b) DISPOSAL OF TANNERY AND LEATHER WASTES.**

*Object.*—To profitably utilize tannery and leather wastes; to prevent the pollution of drainage water by tannery wastes.

*Cooperation.*—American Leather Chemists' Association, American Tanning Association, and individual tanners; possibly also Hygienic Laboratory.

*Location.*—Washington, D. C., and selected tanneries.

*Date begun.*—1913.

*Results.*—It has been shown that the purification of tannery waste liquors can be effected by an inexpensive and simple procedure; paper prepared and printed by the American Leather Chemists' Association.

*Probable date of completion.*—About 1917.

*Assignment.*—Man to be appointed.

*Proposed expenditures, 1914-15.*—\$1,000.

**(c) INVESTIGATION OF THE COMPOSITION OF LEATHER AND TANNING AND FINISHING MATERIALS.**

*Object.*—To secure information on the composition of these materials; to improve existing methods and to devise new methods, where needed, and to show the relation between composition and quality.

*Cooperation.*—Association of Official Agricultural Chemists, American Leather Chemical Association, International Association of Leather Trades Chemists.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Extensive experiments on the clarification of leather extracts for sugar determination have been completed; results confirm the accuracy of the normal-lead-acetate method; work to determine a satisfactory method for the detection of free mineral acids in leather under way.

*Assignment.*—J. S. Rogers.

*Proposed expenditures, 1914-15.*—\$1,350.

**(d) DETERIORATION OF UPPER, BOOKBINDING, AND OTHER LIGHT LEATHERS.**

*Object.*—To discover the causes of deterioration and prevent same; to eliminate harmful materials in the processes of manufacture.

*Cooperation.*—War Department, American Library Association, individual libraries, and tanners.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Harmful effects of large quantities of sulphuric acid used in manufacture conclusively shown.

*Assignment.*—J. S. Rogers.

*Proposed expenditures, 1914-15.*—\$800.

**(e) TANNING SOLE AND HARNESS LEATHER ON A SMALL SCALE.**

*Object.*—To ascertain tanning methods which may be successfully and economically used by farmers and small shoe and harness makers in the tanning of sole and harness leathers on a small scale.

*Cooperation.*—Small tanners.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Work not yet undertaken.

*Probable date of completion.*—1915.

*Assignment.*—Man to be appointed.

*Proposed expenditures, 1914-15.*—\$1,400.

**Investigations of Wood and Wood Products:****(a) WOOD DISTILLATION—GENERAL.**

*Object.*—To improve methods and apparatus used in wood distillation, shorten the time of operation in distillation, investigate the utilization of waste woods, investigate and encourage the production of marketable articles not heretofore recoverable from the wastes, and to secure information on processes and yields of products.

*Cooperation.*—Wood distillers, sawmills, and lumbermen.

*Location.*—Washington, D. C.; work in the South Atlantic States.

*Date begun.*—1901.

*Results.*—Active work done during the past year confined to analysis and calculations of results on field work on resinous wood at Wilmington, N. C., preparatory to publication.

*Probable date of completion.*—About 1918.

*Assignment.*—M. G. Donk.

*Proposed expenditures, 1914-15.*—\$500.

**Investigations of Wood and Wood Products—Continued.****(b) DISTILLATION OF IDAHO WOOD—**

*Object.*—To determine the value of different species for distillation purposes and the most profitable utilization.

*Cooperation.*—University of Idaho.

*Location.*—Moscow, Idaho.

*Date begun.*—1914.

*Results.*—Promising results obtained on yields of various products obtainable from different Idaho woods.

*Probable date of completion.*—1916.

*Assignment.*—M. G. Donk.

*Proposed expenditures, 1914-15.*—\$1,500.

**(c) PRODUCTION OF ROSIN OIL FROM CUT RESINOUS WOOD—**

*Object.*—To devise methods for the profitable utilization of the heavy oils from resinous-wood distillation.

*Cooperation.*—Wood distillers and consumers.

*Location.*—Washington, D. C.; works in the South Atlantic States.

*Date begun.*—1901.

*Results.*—Laboratory work practically concluded gives warrant to the belief that satisfactory rosin oil can be prepared from heavy oils produced by the destructive distillation of resinous wood.

*Probable date of completion.*—1916.

*Assignment.*—C. F. Speh.

*Proposed expenditures, 1914-15.*—\$500.

**(d) INVESTIGATIONS OF WOOD TURPENTINE—**

*Object.*—To improve the quality of wood turpentine.

*Cooperation.*—Wood distillers and consumers.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—One publication issued.

*Probable date of completion.*—1916.

*Assignment.*—C. F. Speh.

*Proposed expenditures, 1914-15.*—\$700.

**(e) STANDARDIZATION OF ROSIN GRADES AND PREPARATION OF PERMANENT ROSIN TYPES—**

*Object.*—To insure uniform grades of rosin by establishing permanent standards.

*Cooperation.*—Individual producers, factories, and rosin users.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Standard grades established and approved by naval stores industry; permanent rosin and turpentine type samples in course of preparation.

*Assignment.*—C. F. Sammet.

*Proposed expenditures, 1914-15.*—\$4,500 (naval stores).

**(f) IMPROVEMENT OF THE QUALITY OF ROSIN.**

*Object.*—To promote the production of rosin of high grade and to increase the yield of rosin from the gum.

*Cooperation.*—Turpentine producers.

*Location.*—Washington, D. C.; selected turpentine stills.

*Date begun.*—1913.

*Results.*—Work has shown absolutely that it is possible to make much better grades of rosin than are now being made in the South and that there is a big field for improvement in the preparation of rosin and turpentine.

*Probable date of completion.*—1915.

*Assignment.*—C. F. Speh.

*Proposed expenditures, 1914-15.*—\$500 (naval stores).

**(g) METHODS OF ANALYSIS OF TURPENTINE, ROSIN, AND WOOD PRODUCTS—**

*Object.*—To devise accurate methods for determining the constituents in these articles, to serve as a basis for research work in production and for the preparation of specifications.

*Cooperation.*—American Society for Testing Materials.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Work done has shown quite conclusively that accurate and comparable results can not be obtained except under definite controlled conditions.

*Assignment.*—M. G. Donk.

*Proposed expenditures, 1914-15.*—\$1,020.

**Investigations of Wood and Wood Products—Continued.****(h) ROUTINE ANALYSES OF TURPENTINE AND ROSIN—**

*Object.*—To conduct routine analyses of turpentine and rosin samples necessary to insure compliance with the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Fourteen official samples have been examined under this project.

*Assignment.*—H. P. Holman.

*Proposed expenditures, 1914-15.*—\$200.

**Miscellaneous Technological Investigations:****(a) ANALYSES OF GOVERNMENT CONTRACT SUPPLIES—**

*Object.*—To conduct routine analyses of leather, turpentine, rosin, and other Government contract supplies, to insure delivery of materials of specified quality.

*Cooperation.*—Other departments and State governments.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Up to May 15 of the current year the following samples were analyzed: 1,550 paper, 70 twine, 80 textiles, and 246 leathers.

*Assignment.*—C. F. Sammet.

*Proposed expenditures, 1914-15.*—\$1,780.

**(b) SPECIFICATIONS FOR PAPER, LEATHER, TURPENTINE, ROSIN AND ROSIN OILS, AND PINE OILS—**

*Object.*—To prepare adequate specifications to insure the use of suitable materials, to simplify the purchase thereof, and to reduce cost.

*Cooperation.*—Federal and State governments, purchasing officials, public libraries, and manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—Specifications for these materials have been prepared, following the results obtained in the laboratory, to serve as a basis for the purchase of these materials.

*Assignment.*—F. P. Veitch.

*Proposed expenditures, 1914-15.*—\$1,200.

**Total, Technological Investigations, \$21,560** (general expenses, \$14,340; naval stores, 5,000; statutory, \$2,220).

**CATTLE FOOD AND GRAIN INVESTIGATIONS.****Composition and Value of Range Forage Crops:**

*Object.*—To determine by analytical methods the composition and value of the forage crops growing naturally on the ranges of the arid and semiarid West.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Results of previous work collated and prepared for publication in collaboration with the Bureau of Plant Industry; data now being obtained for two more bulletins on native forage crops.

*Assignment.*—J. K. Haywood, G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$800.

**Effects of Storage and Transportation on Composition of Corn:**

*Object.*—To determine effects of storage and transportation on the chemical composition and value of corn.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Analyses of 150 to 200 samples of corn have been made.

*Assignment.*—G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$800.

**Utilization of Waste By-Products as Cattle Foods:**

*Object.*—To utilize as cattle foods various crop materials which are now waste products.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—A number of manufacturing plants have been visited to obtain information in regard to problems to be solved.

*Assignment.*—J. K. Haywood, G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$500.

**Utilization of Weed Seeds:**

*Object.*—To determine the value of the weed seeds occurring in grains and commercial seeds for animal feeding and other purposes.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—A. L. Winton, J. H. Bornmann.

*Proposed expenditures, 1914-15.*—\$4,000.

**Analysis of Cattle Foods and Grains:**

*Object.*—To aid other bureaus in solving problems in which the composition of cattle food is a factor.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$500.

**Total, Cattle Food and Grain Investigations,** \$6,600 (general expenses, \$4,280; food and drugs, \$1,300; statutory, \$1,020).

**INSECTICIDE AND FUNGICIDE INVESTIGATIONS.****Toxic Effect of Sprays on Fruit Trees through the Soil Medium:**

*Object.*—To determine whether or not orchards can be injured by poisonous sprays acting through the medium of the soil; and if so, under what condition this occurs, and how to remedy it.

*Cooperation.*—Bureau of Entomology.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Chemical work completed; data ready for collation with idea of publication as bulletin; significance of results can not be determined until data have been completely studied.

*Probable date of completion.*—1915.

*Assignment.*—J. K. Haywood, C. C. McDonnell.

*Proposed expenditures, 1914-15.*—\$500.

**Foliage Injury by Lead Arsenate:**

*Object.*—To determine what causes foliage injury in triplumbic arsenate; to determine the action of various impurities in lead arsenate on foliage; to discover spray mixtures which, while acting in an efficient manner as insecticides, will produce a minimum injury to tender foliage.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C., and Arlington, Va.

*Date begun.*—1898.

*Results.*—It has been confirmed that diplumbic arsenate burns where triplumbic does not burn; that by-products found in the preparation of lead arsenates have no effect in burning the foliage. Results of work will be published after some further study and will be of service in judging claims on labels.

*Assignment.*—J. K. Haywood, C. C. McDonnell.

*Proposed expenditures, 1914-15.*—Nominal; incidental to other projects.

**Analysis of Insecticides and Fungicides:**

*Object.*—To aid other bureaus of the department in solving problems which require chemical investigation.

*Cooperation.*—Bureaus of Plant Industry and Entomology.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Samples analyzed and reported to bureaus as requested.

*Assignment.*—C. C. McDonnell.

*Proposed expenditures, 1914-5.*—\$500.

**Efficient Destruction of Fly Larvæ in Horse Manure:**

*Object.*—To prevent the breeding of the house fly in manure and at the same time preserve the fertilizer value of the manure.

*Cooperation.*—Bureaus of Entomology and Plant Industry.

*Location.*—Washington, D. C., and Arlington, Va.

*Date begun.*—1913.

*Results.*—About 20 different chemicals were tried, with the result that borax was found to be the most satisfactory; results of last season's work submitted for publication.

**Efficient Destruction of Fly Larvæ in Horse Manure—Continued.***Probable date of completion.*—1914 or 1915.*Assignment.*—F. C. Cook.*Proposed expenditures, 1914-15.*—\$1,500.**Total, Insecticide and Fungicide Investigations, \$2,500 (general expenses).****PREPARATION, PRESERVATION, AND UTILIZATION OF FRUIT AND VEGETABLE PRODUCTS.****Investigations of Citrus By-Products:***Object.*—The utilization of citrus fruit culls in the manufacture of citric acid, citrate of lime, and citrus fruit oils and juices.*Cooperation.*—Bureau of Plant Industry, California Citrus Fruit Exchange, and Lemon Men's Club.*Location.*—Los Angeles, Cal.*Date begun.*—1910.*Results.*—The work on citrate of lime and oil is three-fourths completed; only preliminary work done on juice; report submitted on analysis of extracts of lemon of different types and ages.*Probable date of completion.*—1916 to 1918.*Assignment.*—E. M. Chace, C. P. Wilson.*Proposed expenditures, 1914-15.*—\$7,860 (general expenses, \$7,140; statutory, \$720).**Utilization of Cull Potatoes:***Object.*—Development on a large scale of methods for drying surplus and cull potatoes.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C., Arlington, Va., and another locality to be determined.*Date begun.*—1912.*Results.*—A method has been developed by which potatoes can be ground, pressed, and dried and utilized as stock feed. The resulting juice can be concentrated and will probably make a yeast food.*Assignment.*—H. C. Gore.*Proposed expenditures, 1914-15.*—\$3,000.**Investigations in Cider Technology:***Object.*—To develop methods of making and preserving apple cider superior to practices in general use; to determine cost of such methods and commercial value; to investigate the profitable utilization of apple pomace.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C., Hood River, Oreg.*Date begun.*—1913.*Results.*—It has been found practicable to ship frozen cider and keep it for months in cold storage before noticeable fermentation occurs.*Probable date of completion.*—1916.*Assignment.*—H. C. Gore.*Proposed expenditures, 1914-15.*—\$2,000.**Potato Analyses:***Object.*—Determination of composition of potato samples sent in by horticulturists.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C.*Date begun.*—1913.*Results.*—Several hundred samples of potatoes submitted by Bureau of Plant Industry have been analyzed.*Assignment.*—H. C. Gore.*Proposed expenditures, 1914-15.*—\$1,000.**Preparation and Preservation of Grape Juices:***Object.*—Determination of best methods of preparing grape juice from different kinds of grapes and preservation of same.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C.*Date begun.*—1911.*Results.*—Three seasons' work completed on composition of juices prepared from grapes grown at department's experimental vineyard at Vineland, N. J. It was found that grape sirups can easily be prepared by liming juices and boiling down.*Probable date of completion.*—1915.*Assignment.*—H. C. Gore.*Proposed expenditures, 1914-15.*—\$500.

**Miscellaneous Fruit and Vegetable Technology Investigations:**

*Object.*—Development of new processes for utilization of fruits and vegetables.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—H. C. Gore.

*Proposed expenditures, 1914-15.*—\$500.

**Total, Preparation, Preservation, and Utilization of Fruit and Vegetable Products,** \$14,980 (general expenses, \$13,300; statutory, \$1,680).

**CANE-SUGAR AND SIRUP INVESTIGATIONS.****Investigations of Cane-Sugar, Sirup, and Molasses Manufacture:**

*Object.*—Analysis of genuine samples of cane sirup and molasses; determination of the influence of seasonal variations and of cane varieties on the composition of the product; determination of effect of various methods of manufacture on the products; study of the use of new methods of clarifying and filtering cane sirup; study of the possible use of invertase in preparing cane sirup which will not granulate or ferment.

*Cooperation.*—Bureau of Plant Industry; sirup makers.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—A test made on inverting cane juice with invertase showed that the process can be applied to the production of a cane sirup in which the sucrose is inverted enough to prevent granulation; description of method for preparing invertase for such uses published in journal of American Chemical Society (July, 1914).

*Assignment.*—C. S. Hudson.

*Proposed expenditures, 1914-15.*—Paid from appropriation for Bureau of Plant Industry; cost estimated at \$5,000.

**Investigation of the Manufacture of Sorghum Sirup:**

*Object.*—To obtain analyses of genuine samples from different parts of the United States; to study the influence of seasonal variations, plant varieties, and methods of manufacture on the product; to determine the effect of various clarifying agents; to study and perfect methods of analysis.

*Cooperation.*—Bureau of Plant Industry and manufacturers.

*Location.*—Washington, D. C., and bureau field laboratories in sorghum-producing districts.

*Date begun.*—1913.

*Results.*—Sorghum sirup has been manufactured under field conditions and samples analyzed and used in judging pure sorghum sirup.

*Assignment.*—S. F. Sherwood.

*Proposed expenditures, 1914-15.*—\$1,000.

**Study of the Physical and Chemical Constants for Pure Carbohydrates:**

*Object.*—To measure the optical rotation and other properties by which the carbohydrates are distinguished from each other.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Measurements have been completed on the rate of mutarotation of the alpha and beta forms of glucose and of the glucose pentacetates, and data are now being prepared for publication. Reports on mannose and galactose in preparation.

*Assignment.*—C. S. Hudson, E. Yanovsky.

*Proposed expenditures, 1914-15.*—\$2,000.

**Miscellaneous Sugar Examinations:**

*Object.*—To conduct miscellaneous analyses of saccharine materials, including sugar beets, sorghum, cornstalk juices, honey, grape juices, etc.

*Cooperation.*—Bureaus of Plant Industry and Entomology.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Proposed expenditures, 1914-15.*—\$500.

**Total, Cane-Sugar and Sirup Investigations,** \$3,500 (general expenses).

**Total, Investigations in Agricultural Chemistry,** \$69,140 (general expenses, \$52,400; food and drugs, \$4,300; naval stores, \$5,000; statutory, \$7,440).

## COLLABORATION WITH OTHER DEPARTMENTS.

**Tests for Post Office Department:**

*Object.*—To conduct such investigations and analyses of food, drugs, or other materials transported through the United States mails as the Post Office Department may request, with a view to preventing the use of the mails for fraudulent purposes.

*Cooperation.*—Post Office Department and Department of Justice.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—The Post Office Department has, as a result of data furnished, prohibited the shipment through the mails of a number of fraudulent medicines.

*Assignment.*—L. F. Kebler.

*Proposed expenditures, 1914-15.*—\$4,000.

**Testing Contract Samples:**

*Object.*—To determine the proper specifications for certain Government contract supplies and to determine whether the goods delivered comply with the specifications. Only such work is done as can not be done by the Bureau of Standards.

*Cooperation.*—Departments of the Government and General Supply Committee.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Specifications have been worked out for a large number of items and economies effected by requiring deliveries to be up to specifications.

*Assignment.*—H. M. Loomis, F. P. Veitch.

*Proposed expenditures, 1914-15.*—\$6,000.

**Miscellaneous Tests for Other Departments:**

*Object.*—To assist in classifying various products under the tariff act and to make chemical analyses for other departments when requested to do so.

*Cooperation.*—Treasury and other departments.

*Location.*—Washington, D. C., and at bureau branch laboratories.

*Date begun.*—1900.

*Results.*—A large number of chemical analyses have been made for and reported to other departments.

*Assignment.*—Chemists in charge of bureau branch laboratories.

*Proposed expenditures, 1914-15.*—\$5,000.

**Total, Collaboration with Other Departments, \$15,000** (general expenses, \$14,000; statutory, \$1,000).

**TESTING FOOD PRODUCTS FOR EXPORT.****Testing Food Products for Export:**

*Object.*—To inspect food products designed for export to foreign countries and to make necessary tests to determine whether the goods will meet the requirements of the country to which consigned.

*Location.*—New York, N. Y.

*Date begun.*—1904.

*Results.*—A large number of samples from shipments for export have been analyzed and certificates of the tests furnished.

*Assignment.*—R. E. Doolittle.

*Proposed expenditures, 1914-15.*—\$4,280 (general expenses).<sup>1</sup>

**POULTRY AND EGG INVESTIGATIONS.****Instruction of Shippers, Carriers, etc., in Handling Poultry and Eggs:**

*Object.*—To disseminate information to shippers, carriers, etc., on the principles of handling eggs and dressed poultry, by personal contact, demonstrations, publications, etc.

*Cooperation.*—Buyers, shippers, railroads, warehouses, dealers; University of Missouri and State Poultry Board.

*Location.*—Missouri, Kansas, Iowa, Texas, Oklahoma, Arkansas, Illinois, eastern coast cities.

*Date begun.*—About 1910.

*Results.*—The work has resulted in a great increase in number of refrigerated packing houses, better grading, shipping, and handling, improved quality, and lessened waste.

*Assignment.*—M. E. Pennington, H. C. Pierce.

*Proposed expenditures, 1914-15.*—\$15,100.

**Preparation of Frozen and Dried Eggs:**

*Object.*—To determine the fitness of certain eggs as food and to study their handling before and after freezing and drying, and their use by bakers and others, in order to save waste and improve quality.

*Cooperation.*—Egg-breaking establishments, bakers, egg shippers, railroads, and cold-storage warehousemen.

*Location.*—Field work at New York City and Philadelphia and in Western States as determined by cooperating shippers; laboratory work at Philadelphia.

*Date begun.*—1911.

*Results.*—Handling methods have been revolutionized and model plants established in East and West.

*Assignment.*—M. E. Pennington, M. K. Jenkins, C. Bengtson, N. Hendrickson, E. Q. St. John.

*Proposed expenditures, 1914-15.*—\$13,060.

**Breakage of Eggs in Transit:**

*Object.*—To determine the causes of breakage, fix responsibility, and devise, test, and demonstrate methods by which damage in transit can be decreased.

*Cooperation.*—National Poultry, Butter, and Egg Association, railroads, egg-package industry, receivers, and warehouses.

*Location.*—New York, Philadelphia, and other egg producing and receiving stations.

*Date begun.*—1913.

*Results.*—Work is well organized, some fundamental facts established, and suggestions made informally to trade for betterment.

*Assignment.*—M. E. Pennington, A. D. Greenlee.

*Proposed expenditures, 1914-15.*—\$14,160.

**Poultry and Egg Research Work:**

*Object.*—To discover fundamental scientific facts bearing on the preservation of quality of poultry and eggs and the prevention of decay.

*Cooperation.*—Buyers, shippers, railroads, warehousemen, and dealers.

*Location.*—Laboratory in Philadelphia and field station; egg-producing and receiving stations.

*Date begun.*—1904.

*Results.*—A bulletin on this work was published in 1913; very interesting facts on sugar contents of eggs observed.

*Assignment.*—M. E. Pennington and assistants.

*Proposed expenditures, 1914-15.*—\$12,000.

**Total, Poultry and Egg Investigations, \$54,320** (general expenses, \$50,000; statutory, \$4,320).

**FISH INVESTIGATIONS.****Handling and Shipping of Fish and Utilization of By-Products:**

*Object.*—To prevent decay of fish during handling from the catch to the consumer, to preserve quality, to utilize fish as foods so far as possible, and to utilize by-products.

*Cooperation.*—Bureau of Fisheries and fish industry.

*Location.*—Philadelphia, Pa.

*Date begun.*—1914.

*Results.*—Work has just started.

*Assignment.*—M. E. Pennington, E. D. Clark.

*Proposed expenditures, 1914-15.*—\$10,000.

**Handling, Preparation, and Packing of Sardines in Maine:**

*Object.*—To collect information on the sardine industry, study methods employed in packing, investigate the causes of spoilage in sardines, and obtain data for establishing tolerances in net weight.

*Location.*—Eastport, Me., Washington, D. C.

*Date begun.*—1913.

*Results.*—Field laboratory has been in operation but a short time; considerable information regarding general conditions gathered.

*Assignment.*—F. C. Weber, H. W. Houghton.

*Proposed expenditures, 1914-15.*—\$5,000.

**Total, Fish Investigations, \$15,000** (general expenses).

## OYSTER AND SHELLFISH INVESTIGATIONS.

**Bacteriological Investigations:**

*Object.*—To aid in determination of standards for shellfish, assist State boards of health in regulating sale of shellfish, and regulate pollution of rivers and harbors.

*Cooperation.*—Hygienic Laboratory of the Treasury Department and various State boards of health.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Shellfish beds have been examined, some have been condemned, and others are at various stages of inspection.

*Assignment.*—Carleton Bates.

*Proposed expenditures, 1914-15.*—\$3,000.

**Investigation of Sanitary Character of Waters over Shellfish Beds:**

*Object.*—To determine whether waters over shellfish beds are polluted and whether the shellfish are polluted; to determine from what beds it is safe to use the shellfish and suggest method of overcoming the trouble.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Work well organized; results on two investigations of Potomac River ready for publication; results on other investigations of Potomac River now being collated.

*Assignment.*—J. K. Haywood, W. W. Skinner, J. W. Sale.

*Proposed expenditures, 1914-15.*—\$1,000.

**Shipping Investigations:**

*Object.*—To determine the best methods of handling, packing, and shipping oysters.

*Cooperation.*—Bureau of Fisheries and Public Health Service.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Work just starting.

*Assignment.*—C. L. Alsberg.

*Proposed expenditures, 1914-15.*—\$1,000.

**Total, Oyster and Shellfish Investigations, \$5,000 (general expenses).**

## BIOLOGICAL INVESTIGATIONS OF FOOD AND DRUG PRODUCTS.

**Study of the Effect on Man and Animals of Substances Contained in Food and Drugs:**

*Object.*—To determine the physiological effects of tin, lead, caffeine, and other substances in foods and drugs.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Assignment.*—C. L. Alsberg.

*Proposed expenditures, 1914-15.*—\$12,000 (general expenses, \$10,000; statutory, \$2,000).

## ENFORCEMENT OF FOOD AND DRUGS ACT.

## ADMINISTRATION.

**Collaboration with State Officials:**

*Object.*—To secure collaboration with State food and drug officials in order to more efficiently enforce the Food and Drugs Act.

*Cooperation.*—Food and drug officials of the various States.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—J. S. Abbott.

*Proposed expenditures, 1914-15.*—\$12,000.

**Interstate Records:**

*Object.*—To keep accurate records of cases under the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Assignment.*—H. J. Demaree.

*Proposed expenditures, 1914-15.*—\$15,500.

**Import Records:**

*Object.*—To keep records of all import cases.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—M. E. Hartman.

*Proposed expenditures, 1914-15.*—\$4,000.

**Preparation of Evidence for Cases:**

*Object.*—To prepare evidence for presentation in cases under the Food and Drugs Act and secure outside witnesses and experts in cases. This project also covers cost of travel to court.

*Cooperation.*—Solicitor of department.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—C. L. Alsberg.

*Proposed expenditures, 1914-15.*—\$25,000.

**Total, Administration, Enforcement of Food and Drugs Act, \$58,100 (food and drugs, \$26,460; statutory, \$31,640).**

**INVESTIGATIONAL WORK.****FOOD INVESTIGATIONS.****Analysis and Composition of Vinegar:**

*Object.*—To develop methods of analysis and to acquire knowledge of the composition of vinegars.

*Cooperation.*—Vinegar manufacturers to some extent.

*Location.*—Washington, D. C.

*Date begun.*—As an active project, July, 1914; preliminary work prior to that date.

*Results.*—Considerable work has been done on this project and the information is used in the administrative work of the bureau in the enforcement of the Food and Drugs Act.

*Assignment.*—A. L. Winton, R. W. Balcom.

*Proposed expenditures, 1914-15.*—\$5,000.

**Composition of American Oils and Fats:**

*Object.*—To obtain data for standards to improve methods of manufacture and to determine adulterants.

*Cooperation.*—Manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—As an active project, July, 1914.

*Results.*—Some work along this line has been done, but methods used and data obtained are not up to date.

*Assignment.*—A. L. Winton, H. S. Bailey.

*Proposed expenditures, 1914-15.*—\$5,000.

**Methods for the Determination of Heavy Metals in Foods:**

*Object.*—To work out standard and more accurate analytical methods for the determination of heavy metals in foods, such as lead, zinc, tin, and arsenic.

*Cooperation.*—Manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—As an active project, July, 1914.

*Results.*—Considerable work has been done along this line, but it is now proposed to make a more extensive study.

*Assignment.*—A. L. Winton, W. D. Collins.

*Proposed expenditures, 1914-15.*—\$5,000.

**Study of Essential Oils:**

*Object.*—To determine composition, develop methods of analysis, and detect adulterants of essential oils.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Methods of analysis have been worked out; analysis of extracts of lemon of different types concluded; a number of aldehydes identified. It is planned to continue the perfection of methods and to extend the work from lemon and orange oils to other essential oils used in food. Collection of samples of peppermint and other oils used in the manufacture of foods and liqueurs, of samples of California and Florida citrus-fruit oils, and of other oils from plants grown in these two States will be made.

**Study of Essential Oils—Continued.**

*Probable date of completion.*—1916.

*Assignment.*—E. M. Chace, A. R. Albright.

*Proposed expenditures, 1914-15.*—\$5,000.

**Methods for the Detection and Identification of Colors in Foods:**

*Object.*—To develop analytical methods for the detection and identification of colors in foods.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—A. L. Winton.

*Proposed expenditures, 1914-15.*—\$3,500.

**Study of Recently Introduced Preservatives:**

*Object.*—To investigate the use, detection, and determination of formic acid and other recently introduced food preservatives.

*Cooperation.*—Food industries.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—A. L. Winton.

*Proposed expenditures, 1914-15.*—\$3,500.

**Sweating of Citrus Fruits:**

*Object.*—Primarily, to study the effects of sweating, and also the influence of methods of cultivation, irrigation, bud selection, altitude, and soil conditions upon the composition of citrus fruits.

*Cooperation.*—Bureau of Plant Industry, growers, and packing houses.

*Location.*—Porterville, Riverside, and Los Angeles, Cal.

*Date begun.*—1913.

*Results.*—Analyses of 250 samples of fruit grown in the northern part of the California citrus belt and 250 samples of southern fruit have been made; report now in preparation.

*Probable date of completion.*—1915 or 1916.

*Assignment.*—E. M. Chace.

*Proposed expenditures, 1914-15.*—\$2,000.

**Study of Experimental Packs of Canned Goods:**

*Object.*—To collect information on tin content, acids, net weight, proper fill, and presence of added water in connection with canned foods; to determine the effect of storage and protective coatings upon canned goods; and to study the relation of grading to quality.

*Cooperation.*—Commissary General, U. S. Army.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Data on a number of products already collected; reports in preparation on some of the work.

*Probable date of completion.*—1920.

*Assignment.*—E. L. P. Treuthardt, A. W. Bromell.

*Proposed expenditures, 1914-15.*—\$1,265.

**Canning Processes and Canning Methods:**

*Object.*—To ascertain the effect of blanching and storage of food products before canning and of other factors upon the composition of the product; also to study filling machines.

*Cooperation.*—Commercial packing houses.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Inspections of factories made and canning processes and methods studied under different conditions; suggestions in regard to sanitation, etc., made and in many cases improvements in conditions accomplished.

*Probable date of completion.*—1916.

*Assignment.*—H. M. Loomis, P. B. Dunbar.

*Proposed expenditures, 1914-15.*—\$1,556.

**Carbonation of Liquids and Drinks:**

*Object.*—To study the rate of evolution of gases from liquids and the effect of colloidal suspensions thereon. To determine the physical characteristics of carbonated liquids. To ascertain the machining processes which produce given carbonation effects.

*Location.*—Washington, D. C.

*Date begun.*—1913.

**Carbonation of Liquids and Drinks—Continued.**

*Results.*—A method of study of the retentivity of a bottled liquid has been developed; the rate of evolution of gas has been mathematically compared with the chemical researches and found not to conform to equation of a mono-molecular reaction. As a result of the above it is possible to tell a bottle-fermented product from an artificially impregnated one. It has been shown that distilled water can be carbonated.

*Assignment.*—H. E. Patten.

*Proposed expenditures, 1914-15.*—\$1,500.

**Study of Acidity in Plant and Animal Juices:**

*Object.*—To determine the true acidity of fruit, vegetable, and animal products; to determine the concentrations of individual chemical bodies in plant and animal juices in their relation to the neutral point between acidity and alkalinity.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—H. E. Patten.

*Proposed expenditures, 1914-15.*—\$2,500.

**Chemistry and Manufacture of Baking Powders:**

*Object.*—To determine the effect of the ingredients of baking powders upon the rate of evolution of gas and its quantity evolved.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Work to date has consisted largely of library work and correspondence; experimental work indicates that some ammonia would be left in the bread; report prepared on phosphate baking powder reactions.

*Assignment.*—H. E. Patten.

*Proposed expenditures, 1914-15.*—\$1,000.

**Bacteriological Analysis of Foods and Drugs:**

*Object.*—To develop methods and formulate standards for the bacteriological analysis of foods and drugs.

*Location.*—Washington, D. C.; possibly field laboratories to be established as the work may require.

*Date begun.*—1907.

*Results.*—Some of the problems completed; others in various stages of investigation; a marked improvement by factories in the handling of their products noted.

*Assignment.*—Carleton Bates.

*Proposed expenditures, 1914-15.*—\$2,500.

**Milk, Cream, and Ice-Cream Investigations:**

*Object.*—To conduct bacteriological investigations of milk, cream, and ice cream in order to assist local health authorities in obtaining an improved supply.

*Cooperation.*—Bureau of Animal Industry and State boards of health.

*Location.*—Washington, D. C., and field laboratories.

*Date begun.*—1907.

*Results.*—Campaigns have been made in certain localities in cooperation with State authorities, followed by improvement in the milk supply in those places.

*Assignment.*—Carleton Bates.

*Proposed expenditures, 1914-15.*—\$1,000.

**Microanalysis of Foods and Drugs:**

*Object.*—To develop microscopical methods and formulate standards for the analysis of food and drug products.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Results.*—Studies on some products completed; method developed for determination of hulls in cottonseed meal.

*Assignment.*—B. J. Howard.

*Proposed expenditures, 1914-15.*—\$2,500 (food and drugs).

**Total, Food Investigations,** \$43,421 (food and drugs, \$42,821; statutory, \$600).

## WATER INVESTIGATIONS.

**Water Analysis:**

*Object.*—To devise new methods of water analysis, improve old methods, and unify them; to determine the radioactivity of waters.

*Cooperation.*—Association of Official Agricultural Chemists, American Public Health Association, and American Chemical Society.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—Progress has been made in perfecting apparatus and methods for detecting and measuring radioactivity of waters; some results published as Bureau of Chemistry Buls. 153 and 91. As a result of this work official methods were adopted by the Association of Official Agricultural Chemists for the examination of waters, and these methods have become the official methods of analysis under the Food and Drugs Act.

*Assignment.*—W. W. Skinner.

*Proposed expenditures, 1914-15.*—\$1,400.

**Sanitary Bottling and Handling of Mineral Waters:**

*Object.*—To determine the best and most cleanly methods possible in the handling and bottling of mineral waters.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Preliminary work in studies of methods of cleaning bottles completed; results being collated and studied to determine what further work is necessary.

*Assignment.*—J. K. Haywood, W. W. Skinner.

*Proposed expenditures, 1914-15.*—\$1,600.

**Impurities in Salt and Brines:**

*Object.*—To determine the barium chlorid in salt and brine, its danger to health, and methods of removal.

*Cooperation.*—Pomeroy Salt Association Company, to the extent that their plant will be used for experimental work.

*Location.*—Washington, D. C., Pomeroy, Ohio.

*Date begun.*—1913.

*Results.*—Work nearly completed. It is hoped that from use of methods devised it will be possible to improve the character of salt produced from brine containing barium.

*Probable date of completion.*—1915.

*Assignment.*—W. W. Skinner, W. F. Baughman.

*Proposed expenditures, 1914-15.*—\$500.

**Total, Water Investigations, \$3,500 (food and drugs).**

## CATTLE FOOD INVESTIGATIONS.

**Standards for Cattle Feeds:**

*Object.*—To determine standards for bran, malt sprouts, feed barley, and other cattle feeds.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—Large amount of work performed on establishing standards; mills visited and samples obtained; manufacturers have been shown so clearly that added screenings have no place in bran and other by-product feeds that they have entirely changed their nomenclature; a method developed by which added screenings can in most cases be detected.

*Assignment.*—G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$1,200 (food and drugs).

## ORGANIC CHEMICAL INVESTIGATIONS.

**Properties of Amino Acids:**

*Object.*—Isolation, identification, and determination of amino acids, as a basis for the study of foods.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—I. K. Phelps, L. H. Almy.

*Proposed expenditures, 1914-15.*—\$3,500.

**Nonsugars in Natural Sirups and Crude Sugars:***Object.*—Isolation and identification of nonsugars.*Location.*—Washington, D. C.*Date begun.*—July, 1914.*Assignment.*—I. K. Phelps, G. A. Geiger.*Proposed expenditures, 1914-15.*—\$2,500.**Organic Acids of Nature:***Object.*—Isolation and identification of organic acids of nature.*Location.*—Washington, D. C.*Date begun.*—July, 1914.*Assignment.*—I. K. Phelps.*Proposed expenditures, 1914-15.*—\$3,000.**Separation and Identification of Alcohols in Food Products:***Object.*—Isolation and identification of alcohols found in food products.*Cooperation.*—Bureau of Internal Revenue.*Location.*—Washington, D. C.*Date begun.*—July, 1914.*Assignment.*—I. K. Phelps.*Proposed expenditures, 1914-15.*—\$2,500.**Study of Methods of Analysis:***Object.*—To improve methods of analysis.*Cooperation.*—Association of Official Agricultural Chemists.*Location.*—Washington, D. C.*Date begun.*—July, 1914.*Assignment.*—I. K. Phelps.*Proposed expenditures, 1914-15.*—\$2,500.**Total, Organic Chemical Investigations, \$14,000 (food and drugs, \$13,400; statutory, \$600).****PHARMACOGNOSY INVESTIGATIONS.****Pharmacognosy Investigations:***Object.*—To determine the chemical, physiological, and morphological characteristics of plants and drugs, and to devise new and improved methods of analysis.*Cooperation.*—Bureau of Plant Industry.*Location.*—Washington, D. C.*Date begun.*—July, 1914.*Assignment.*—Arno Viehoveer.*Proposed expenditures, 1914-15.*—\$7,500 (food and drugs).**PHARMACOLOGICAL INVESTIGATIONS.****Caffeine Investigations:***Object.*—To study the physiological action of caffeine under various conditions, and to determine its effect on health when contained in beverages or when used in medicines.*Location.*—Washington, D. C.*Date begun.*—1909.*Results.*—Investigation on caffeine glycosuria and influence of calcium upon it continued. It has been found that calcium exerts a stimulation, followed by inhibition of glycosuria. Report on effect of caffeine on creatin and creatinin metabolism published in American Journal of Physicians, March, 1914.*Probable date of completion.*—1915.*Assignment.*—Wm. Salant.*Proposed expenditures, 1914-15.*—\$2,000.**Effect of Alcohol on Nutrition:***Object.*—To secure reliable data on the effect of alcohol on metabolism and comparative toxicity, acute and chronic, of various alcohols.*Location.*—Washington, D. C.*Date begun.*—1909.*Results.*—Experiments on the effect of alcohol on metabolism completed; experiments on comparative toxicity well under way.*Probable date of completion.*—1915.*Assignment.*—Wm. Salant.*Probable expenditures, 1914-15.*—\$750.

**Toxicity and Pharmacology of Oil of Chenopodium:**

*Object.*—To study the toxicity and pharmacology of oil of chenopodium to determine effect upon health.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Experiments well under way.

*Probable date of completion.*—1915.

*Assignment.*—Wm. Salant, E. K. Nelson.

*Probable expenditures, 1914-15.*—\$750.

**Pharmacology of Tin and Zinc:**

*Object.*—To secure data on the pharmacology of these metals to determine the effect upon health when contained in food products.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Report of absorption and elimination of tin published in Journal of Biological Chemistry, March, 1914; further reports on tin and reports on zinc in preparation.

*Probable date of completion.*—1915.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$2,000.

**Pharmacological Action of Tartrates and Citrates:**

*Object.*—To study the pharmacological action of these substances to determine their effect on health when contained in food products or when used in medicines.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Experiments concluded and results ready for publication.

*Probable date of completion.*—1915.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$2,000.

**Pharmacological Action of Turpentine:**

*Object.*—To determine effect of turpentine on health when used in painting and in medicines.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Probable date of completion.*—1916.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$1,000.

**Physiological Tests of Ergot, Cannabis Indica, and Digitalis:**

*Object.*—To conduct physiological tests of ergot, *Cannabis indica*, and digitalis to ascertain the quality of the drugs.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Experiments well under way; data obtained on tolerance, effect on smooth muscle, and effect of alcohol with action of ergot.

*Probable date of completion.*—About 1916.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$2,000.

**Pharmacology and Toxicology of Lac Dyes:**

*Object.*—To study the pharmacology and toxicology of lac dyes to determine their effect on health when contained in food products.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Probable date of completion.*—About 1916.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$1,500.

**Pharmacology and Toxicology of Food Colors:**

*Object.*—To study the pharmacology and toxicity of permitted dyes to determine their effect on health when contained in food products.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Probable date of completion.*—1915.

*Assignment.*—Wm. Salant.

*Probable expenditures, 1914-15.*—\$1,500.

**Total, Pharmacological Investigations, \$13,560 (food and drugs, \$12,840; statutory \$720).**

## CARBOHYDRATE INVESTIGATIONS.

**Maple Investigations:**

*Object.*—To investigate trade and factory conditions in connection with the manufacture of maple products and to study and improve methods for the detection of adulteration in such products.

*Cooperation.*—Manufacturers and packers and State authorities and associations.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Considerable investigation made on pure products and the work published; little progress made along the line of trade and factory methods of refining, mixing, etc.

*Assignment.*—S. F. Sherwood.

*Probable expenditures, 1914-15.*—\$2,500.

**Honey Investigations:**

*Object.*—To test methods of determining adulteration of honey by addition of cane sugar, commercial invert sugar, or glucose; to study granulation and other changes in honey in storage.

*Cooperation.*—Bureau of Entomology.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Directions worked out for crystallizing fructose from honey; method devised for estimating sucrose in honey; experiments made to determine the cause of granulation of honey and devise means of preventing such granulation.

*Assignment.*—C. S. Hudson, M. N. Straughn, T. S. Harding.

*Proposed expenditures, 1914-15.*—\$700.

**Candy Investigations:**

*Object.*—To study the physical and chemical changes which occur during the manufacture and keeping of candy.

*Cooperation.*—Candy manufacturers and members of National Confectioners' Association.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Tests of sugar made to determine the suitability of such commercial sugar for the making of transparent hard candy. A collection has been made of a number of imported candy samples.

*Assignment.*—C. S. Hudson, J. Hamilton.

*Proposed expenditures, 1914-15.*—\$2,500.

**Investigations in the Manufacture of Fruit Sirups, Jams, Preserves, and Jellies:**

*Object.*—To obtain analyses of pure products and of mixtures of known origin. It is planned to study the commercial manufacture of marmalades, jellies, and jams, having samples made under the supervision of the laboratory to be used for analysis in determining standards.

*Cooperation.*—Bureau of Plant Industry and manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Samples made in the laboratory and compared with commercial samples; no definite results as yet.

*Assignment.*—M. N. Straughn, C. G. Church.

*Proposed expenditures, 1914-15.*—\$2,500.

**Preparation of Pure Carbohydrates:**

*Object.*—To determine the best methods for preparing the various sugars and other carbohydrates in pure condition.

*Cooperation.*—Bacteriologists working on public-health investigations.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Work being organized; plans about completed.

*Assignment.*—C. S. Hudson, T. S. Harding.

*Proposed expenditures, 1914-15.*—\$1,000.

**Methods of Analysis for Carbohydrates:**

*Object.*—To test and improve general analytical methods for carbohydrates; to utilize the selective action of enzymes in new methods of analysis.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Assignment.*—C. S. Hudson, J. M. Johnson, T. S. Harding.

*Proposed expenditures, 1914-15.*—\$2,500.

**Total, Carbohydrate Investigations,** \$11,700 (food and drugs, \$9,860; statutory, \$1,840).

**INVESTIGATIONS OF DAIRY PRODUCTS.****Determination of Alkali in Butter:**

*Object.*—To devise methods for the detection of alkali used in the manufacture of butter.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Method worked out, but more experience in using it will be necessary before any definite results can be obtained.

*Probable date of completion.*—1915.

*Assignment.*—G. E. Patrick.

*Proposed expenditures, 1914-15.*—\$500.

**Determination of Gelatin in Ice Cream:**

*Object.*—To devise a method for detecting the addition of gelatin to ice cream and similar products as a thickener.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Probable date of completion.*—1915.

*Assignment.*—C. H. Biesterfeld.

*Proposed expenditures, 1914-15.*—\$500.

**Investigation of Effects of Added Chemicals on the Quality of Butter:**

*Object.*—To determine the effect of neutralizers and other added chemicals on the quality of butter, and to ascertain whether the use of such substances is necessary.

*Cooperation.*—Manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—G. E. Patrick.

*Proposed expenditures, 1914-15.*—\$500.

**Total, Investigations of Dairy Products,** \$1,500 (food and drugs).

**BEVERAGE INVESTIGATIONS.****Changes in Distilled Spirits During Storage:**

*Object.*—To determine the composition of distilled spirits stored under varying conditions, to enable the bureau to properly interpret analyses of samples of commercial spirits.

*Cooperation.*—Distilleries.

*Location.*—Washington, D. C., Louisville, Ky., and other distillery points.

*Date begun.*—1908.

*Results.*—Samples have been stored six years, and work is nearing completion.

*Probable date of completion.*—About 1916.

*Assignment.*—J. G. Riley.

*Proposed expenditures, 1914-15.*—\$1,200.

**Investigation of the Composition of Malt Beverages:**

*Object.*—To determine the composition of malt beverages made from different materials.

*Cooperation.*—Various breweries.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Work completed on 6-row barley beers

*Assignment.*—J. G. Riley.

*Proposed expenditures, 1914-15.*—\$1,200

**Investigation of the Composition of Cordials and Brandies:**

*Object.*—To determine the composition of cordials and brandies made in different ways and of various kinds of fruit.

*Cooperation.*—Bureau of Internal Revenue.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—A considerable number of cordials and brandies have been analyzed and the results used in the detection of adulterated and misbranded products collected under the Food and Drugs Act.

*Probable date of completion.*—About 1916.

*Assignment.*—J. G. Riley.

*Proposed expenditures, 1914-15.*—\$1,200.

**Investigation of the Composition of Foreign Ports and Sherries and Other Wines:**

*Object.*—To determine the composition of samples of wine of known origin.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Work is organized and preliminary samples have been collected.

*Probable date of completion.*—About 1917.

*Assignment.*—M. J. Ingle.

*Proposed expenditures, 1914-15.*—\$1,200.

**Effect of Essential Oils on Fusel-Oil Determination in Distilled Liquors:**

*Object.*—To determine whether essential oils affect the accuracy of fusel-oil determination in distilled liquors.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Probable date of completion.*—About 1916.

*Assignment.*—J. G. Riley.

*Proposed expenditures, 1914-15.*—\$1,200.

**Investigation of Nonalcoholic Beverages:**

*Object.*—To investigate the manufacture of nonalcoholic beverages and to determine the composition of authentic samples.

*Cooperation.*—Manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Probable date of completion.*—About 1917.

*Assignment.*—J. G. Riley.

*Proposed expenditures, 1914-15.*—\$1,200.

**Total, Beverage Investigations, \$7,200 (food and drugs, \$6,240; statutory, \$960).**

**DRUG INVESTIGATIONS.****Methods of Drug Analysis:**

*Object.*—To study methods of analyses of drug products to secure data as a basis for the enforcement of the Food and Drugs Act.

*Cooperation.*—Bureau of Plant Industry, and State and municipal officials.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—A number of methods of analysis have been worked out and published.

*Assignment.*—L. F. Kebler.

*Proposed expenditures, 1914-15.*—\$6,000.

**Permissible Variations in Drug Products:**

*Object.*—To determine what should constitute permissible variations in the composition of drug products under different conditions.

*Cooperation.*—Bureau of Plant Industry, and State and municipal officials.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Permissible variations in a number of drug products have already been determined.

*Assignment.*—L. F. Kebler.

*Proposed expenditures, 1914-15.*—\$4,000.

**Elimination of Inert and Objectionable Material in Crude Drugs:**

*Object.*—To study methods of elimination of inert and objectionable material occurring incidental to the gathering of crude drugs.

*Cooperation.*—Bureau of Plant Industry, and State and municipal officials.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—Means for elimination of inert material in a number of imported products have been worked out and applied to shipments.

*Assignment.*—L. F. Kebler.

*Proposed expenditures, 1914-15.*—\$4,000.

**Total, Drug Investigations,** \$14,000 (food and drugs, \$12,000; statutory, \$2,000).

**Total, Investigational Work, Enforcement of Food and Drugs Act,** \$117,581 (food and drugs, \$110,861; statutory, \$6,720).

**REGULATORY WORK.****FOOD CONTROL.****Preparation of Cases, Announcements, Standards, and Definitions:**

*Object.*—To review cases, prepare correspondence, service and regulatory announcements and advisory standards and definitions, make analyses and check analyses, and compile data for court cases in connection with the enforcement of the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law is being obtained.

*Assignment.*—H. M. Loomis, P. B. Dunbar.

*Proposed expenditures, 1914-15.*—\$37,600.

**Control of Water and Mineral-Water Salts:**

*Object.*—To make analysis of interstate and import samples; review cases; handle correspondence; complete data for court cases, and other necessary work in the enforcement of the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law being obtained.

*Assignment.*—J. K. Haywood, W. W. Skinner.

*Proposed expenditures, 1914-15.*—\$15,400.

**Control of Stock Food and Grains:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law.

*Assignment.*—J. K. Haywood, G. L. Bidwell.

*Proposed expenditures, 1914-15.*—\$9,400.

**Control of Carbohydrate Products:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law.

*Assignment.*—C. S. Hudson, M. N. Straughn.

*Proposed expenditures, 1914-15.*—\$8,000.

**Control of Dairy Products:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law.

*Assignment.*—G. E. Patrick.

*Proposed expenditures, 1914-15.*—\$10,600.

**Microchemical Examination of Food and Drug Products:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the law.

*Assignment.*—B. J. Howard.

*Proposed expenditures, 1914-15.*—\$7,000.

**Bacteriological Examination of Food and Drug Products:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C., and temporary headquarters at various places throughout the United States as circumstances require.

*Date begun.*—1907.

*Results.*—General compliance with the law.

*Assignment.*—C. Bates.

*Proposed expenditures, 1914-15.*—\$15,000.

**Total, Food Control,** \$103,000 (food and drugs, \$78,520; statutory, \$24,480).

**DRUG CONTROL.****Drug Analysis:**

*Object.*—To conduct analyses of interstate and import drugs and drug products to determine if same are in compliance with the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with the Food and Drugs Act has been obtained.

*Assignment.*—L. F. Kebler, W. O. Emery, E. K. Nelson, A. G. Murray.

*Proposed expenditures, 1914-15.*—\$25,000.

**Preparation of Cases:**

*Object.*—To review cases and handle correspondence in reference to drug products in the enforcement of the Food and Drugs Act.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Results.*—General compliance with law.

*Assignment.*—L. F. Kebler, W. O. Emery, E. K. Nelson, A. G. Murray.

*Proposed expenditures, 1914-15.*—\$10,000.

**Total, Drug Control,** \$35,000 (food and drugs, \$27,200; statutory, \$7,800).

**FIELD FOOD AND DRUG INSPECTION.****Inspection Work:**

*Object.*—To collect samples, inspect factories, and secure data bearing on food and drug industries.

*Cooperation.*—State food and drug inspectors and Bureau of Animal Industry inspectors.

*Location.*—District headquarters at Washington, D. C., Chicago, Ill., and San Francisco, Cal. Inspectors travel over the whole United States.

*Date begun.*—1907.

*Results.*—A large number of samples collected, factories inspected, and data assembled.

*Assignment.*—W. G. Campbell, L. M. Tolman, B. R. Hart.

*Proposed expenditures, 1914-15.*—\$130,000 (food and drugs, \$51,030; statutory, \$78,970).

**Hearings and Correspondence:**

*Object.*—To hold hearings, conduct correspondence, and prepare cases at district headquarters and at branch laboratories in connection with the enforcement of the Food and Drugs Act as applied to both interstate and import business.

*Location.*—District headquarters at Washington, D. C., Chicago, Ill., San Francisco, Cal., and at branch laboratories.

*Date begun.*—1907.

*Assignment.*—W. G. Campbell, L. M. Tolman, and B. R. Hart.

*Proposed expenditures, 1914-15.*—Classified by laboratories below.

**Examination of Samples:**

*Object.*—To make chemical and other analyses of samples of foods and drugs to determine whether or not they are adulterated or misbranded.

*Location.*—District headquarters and branch laboratories of Bureau of Chemistry.

*Date begun.*—1907.

*Assignment.*—W. G. Campbell, L. M. Tolman, and B. R. Hart.

*Proposed expenditures, 1914-15.*—Classified by laboratories below.

**Insecticide Work:**

*Object.*—To hold and report hearings, collect samples of both interstate and import shipments, and conduct other routine work in connection with the enforcement of the Insecticide Act.

*Cooperation.*—Insecticide and Fungicide Board.

*Location.*—District headquarters and branch laboratories.

*Date begun.*—1910.

*Assignment.*—W. G. Campbell, L. M. Tolman, and B. R. Hart.

*Proposed expenditures, 1914-15.*—Classified by laboratories below.

**Regulatory Investigations:**

*Object.*—To develop methods of analysis, detect and study new adulterants, secure data on trade practices, and to study food and drug industries, in order to properly enforce the Food and Drugs Act.

*Location.*—District headquarters and branch laboratories.

*Date begun.*—1907.

*Assignment.*—W. G. Campbell, L. M. Tolman, and B. R. Hart.

*Proposed expenditures, 1914-15.*—Classified by laboratories below.

In addition to the four preceding subactivities, which are common to all the branch laboratories, some of these laboratories carry on specialized work in connection with certain products coming under the Food and Drugs Act, either because of proximity to the center of some industry or because of having specially qualified men to do the work. This specialized work is indicated in the column "Character of specialized work" in the following table:

**BRANCH FOOD AND DRUG LABORATORIES.**

| Location.                               | Character of specialized work.                                     | Assignment.                          | Proposed expenditures, 1914-15. |
|---|--|--------------------------------------|---------------------------------|
| Eastern district.....                   |  | W. G. Campbell, chief of district.   |                                 |
| Washington, D. C., head-quarters.....   |  | W. J. McGee.....                     | \$25,000                        |
| New York, N. Y.....                     | Aniline dyes, drugs, and heavy metals in foods; heavy import work. | R. E. Doolittle.....                 | 77,890                          |
| Boston, Mass.....                       |  | A. L. Sullivan.....                  | 17,340                          |
| Philadelphia, Pa.....                   |  | C. S. Brinton.....                   | 9,460                           |
| Buffalo, N. Y.....                      |  | Vacant.....                          | 7,500                           |
| Savannah, Ga.....                       |  | W. C. Burnet.....                    | 7,160                           |
| San Juan, P. R.....                     |  | Vacant.....                          | 4,220                           |
| Central district.....                   |  | L. M. Tolman, chief of district..... |                                 |
| Chicago, Ill., headquarters.....        | Wines and drugs.....   | Geo. W. Hoover.....                  | 55,470                          |
| St. Paul, Minn.....                     | Vinegar.....   | E. H. Goodnow.....                   | 9,540                           |
| St. Louis, Mo.....                      |  | D. B. Bisbee.....                    | 10,000                          |
| Cincinnati, Ohio.....                   |  | Vacant.....                          | 9,000                           |
| New Orleans, La.....                    |  | F. W. Liepsner.....                  | 7,000                           |
| Western district.....                   |  | B. R. Hart, chief of district.....   |                                 |
| San Francisco, Cal., head-quarters..... | Salmon packing.....  | R. W. Hiltz.....                     | 25,930                          |
| Seattle, Wash.....                      |  | A. L. Knisely.....                   | 11,680                          |
| Denver, Colo.....                       | Dried fruits and bacteriological examinations.                     | R. S. Hiltner.....                   | 16,200                          |
| Honolulu, Hawaii.....                   |  | A. W. Hansen.....                    | 4,000                           |

**Total, Field Food and Drug Inspection,** \$433,820 (food and drugs, \$290,620; statutory, \$143,200).

**Total, Regulatory Work, Enforcement of Food and Drugs Act,** \$571,820 (food and drugs, \$396,340;<sup>1</sup> statutory, \$175,480).

<sup>1</sup> The total allotments to projects under the appropriation "Enforcement of the Food and Drugs Act" are approximately \$80,000 less than the appropriation. This balance is held in reserve for new projects, additional allotments to existing projects, when necessary, for necessary litigation, etc.

## BUREAU OF SOILS.

### GENERAL BUREAU ADMINISTRATION.

#### Office of Chief of Bureau:

*Object.*—General administration, supervision, and direction of the activities and operations of the bureau.

*Cooperation.*—All the bureaus of the department, other executive departments, and with State institutions.

*Location.*—Washington, D. C.

*Date begun.*—1894.

*Assignment.*—Milton Whitney.

*Proposed expenditures, 1914-15.*—\$5,400 (statutory).

#### Office of Chief Clerk:

*Object.*—The chief clerk is charged with carrying out the directions and policies of the chief of bureau as these relate to supervision and control of the clerical work, including the handling of correspondence and mail, stenographic service, messenger service, and property and supplies.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—A. G. Rice.

*Proposed expenditures, 1914-15.*—\$12,960 (general expenses, \$900; statutory, \$12,060).

#### Accounts Section:

*Object.*—To keep records of financial operations of the bureau, prepare authorizations for travel, issue requisitions for the purchase of supplies, make administrative examination of all accounts, prepare pay rolls, keep for record copies of contracts and leases, keep liability records and prepare monthly statements of the same, and prepare such other financial reports as may be required.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—C. A. Wolfe.

*Proposed expenditures, 1914-15.*—\$4,400 (statutory).

#### Editorial Section:

*Object.*—To read for the chief of bureau all manuscripts submitted for publication, edit or rewrite such manuscripts as may be necessary to bring them into harmony with the bureau's policy, compile data for the use of the soil survey field men, and rewrite or rearrange those reports not submitted in proper form; read and correct proof and assist in the preparation of specifications for the lithographic reproduction of maps and in proof reading of the same.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—Chas. H. Seaton.

*Proposed expenditures, 1914-15.*—\$7,400 (statutory). Detailed to secretary's office (Office of Information), \$1,800 (statutory).

#### Supply Section:

*Object.*—To supervise and distribute all supplies and equipment purchased for field, laboratory, and office use, and record the same.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—J. F. Pevare.

*Proposed expenditures, 1914-15.*—\$4,400 (general expenses, \$2,300; statutory, \$2,100).

#### Files and Records Section:

*Object.*—To index and file all correspondence pertaining to the operations of the bureau.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Assignment.*—Henry A. Donovan.

*Proposed expenditures, 1914-15.*—\$2,600 (statutory).

**Total, General Bureau Administration, \$38,960** (general expenses, \$3,200; statutory, \$35,760).

## SOIL CHEMICAL INVESTIGATIONS.

**Administration:**

*Object.*—To direct the soil chemical investigations and carry on routine laboratory and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—F. K. Cameron, C. C. Fletcher.

*Proposed expenditures, 1914-15.*—\$2,716.67 (general expenses, \$1,850; statutory, \$866.67).

**Mineral Content of Agriculturally Important American Soils:**

*Object.*—To determine the predominating minerals or those which characterize the soil.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—Minerals, recognizable in several hundred soil samples, have been determined and the data made available for various subactivities of the bureau and for outside institutions requesting such data.

*Assignment.*—W. H. Fry.

*Proposed expenditures, 1914-15.*—\$1,240.07.

**Absorption by Soils:**

*Object.*—To determine the effect of various substances on the absorption of soluble salts and the fixation of fertilizer constituents by soils.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Soils shown to have specific absorptive capacities; law of rate deduced and experimentally verified; effect of texture determined; mutual influence of mixed solutes demonstrated; importance for retention of soluble fertilizers demonstrated.

*Assignment.*—E. G. Parker.

*Proposed expenditures, 1914-15.*—\$1,620.23.

**Lime Phosphate Investigations:**

*Object.*—To investigate the nature of the lime phosphates occurring naturally in soils and produced by the application of phosphatic fertilizers.

*Location.*—Washington, D. C.

*Date begun.*—1901.

*Results.*—Nature of solid phosphates of lime, magnesia, and iron in contact with free solutions has been determined; similar data for very dilute solutions and for soil waters being investigated.

*Assignment.*—P. J. Fox, W. H. Fry.

*Proposed expenditures, 1914-15.*—\$1,159.93.

**Inorganic Composition of Soils:**

*Object.*—To determine all inorganic constituents of soils and subsoils for which reliable analytical methods are available, with regard to the principal agricultural soils of the United States.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Results.*—Twenty-seven soils completely analyzed and about 50 partially analyzed; presence of nearly every element in every soil demonstrated; correlations between origin, composition, and productivity partly worked out.

*Assignment.*—W. O. Robinson, L. A. Steinkoenig.

*Proposed expenditures, 1914-15.*—\$2,040.07.

**Ash Analysis of Important Crop Plants:**

*Object.*—To determine what mineral elements recognized in the soils are commonly absorbed by plants.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—A few analyses made and data collected from the literature; work just organized.

*Assignment.*—W. O. Robinson, L. A. Steinkoenig.

*Proposed expenditures, 1914-15.*—\$2,040.07.

**Methods for Determining Phosphoric Acid in Soils and Fertilizers:**

*Object.*—To examine critically methods so far proposed for the purpose of developing a reliable analytical procedure.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Important analytical procedure for very accurate work on soil minerals has been worked out.

*Assignment.*—W. O. Robinson.

*Proposed expenditures, 1914-15.*—\$400.

**Rapid-Conducting Apparatus:**

*Object.*—To develop an apparatus for the accurate and graphic conductivity of solutions for laboratory and field use.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Valuable data secured looking to the development of a practical instrument.

*Assignment.*—P. J. Fox.

*Proposed expenditures, 1914-15.*—\$200.

**Hydrolytic Decomposition of Soil-Forming Minerals:**

*Object.*—To determine the characteristic changes by the action of water on the rock and soil-forming minerals.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Development of a rational theory of the function and importance of the soil solution.

*Assignment.*—P. J. Fox and W. H. Fry.

*Proposed expenditures, 1914-15.*—\$1,769.23.

**Routine Chemical Laboratory:**

*Object.*—To make chemical analysis of soils, waters, and similar materials for the bureau, other bureaus of the department, and properly accredited parties.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Data provided for various subactivities of the bureau and outside institutions.

*Assignment.*—J. G. Smith, R. F. Gardner, and C. F. Miller.

*Proposed expenditures, 1914-15.*—\$5,130.50.

**Methods for Determining Nitrogen in Soils and Fertilizers:**

*Object.*—To determine relative value of existing methods or new ones to be formulated.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Work just organized.

*Assignment.*—Not yet made.

*Proposed expenditures, 1914-15.*—\$2,210.07.

**Significance of Analytical Data for Soil Productivity:**

*Object.*—To make a critical comparison of existing analytical data for soils of known productivity.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Work just organized.

*Assignment.*—Not yet made.

*Proposed expenditures, 1914-15.*—\$1,730.44.

**Liming of Soils:**

*Object.*—To determine the effects of liming and a proper basis for the practice of liming soils.

*Location.*—Washington, D. C., and field assignments.

*Date begun.*—1914.

*Results.*—Work just organized.

*Assignment.*—Not yet made.

*Proposed expenditures, 1914-15.*—\$959.39.

**Total, Soil Chemical Investigations, \$23,216.67** (general expenses, \$22,350; statutory, \$866.67).

## SOIL PHYSICAL INVESTIGATIONS.

**Administration:**

*Object.*—To direct the soil physical investigations and carry on routine laboratory and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—F. K. Cameron, C. C. Fletcher.

*Proposed expenditures, 1914-15.*—\$2,716.66 (general expenses, \$1,850; statutory, \$866.66).

**Designing, Construction, and Standardization of Instruments:**

*Object.*—To assist in the activities of the bureau by furnishing or standardizing physical instruments.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Assistance rendered other activities.

*Assignment.*—Harry Bryan.

*Proposed expenditures, 1914-15.*—\$1,592.55.

**Mechanical Analysis of Soils:**

*Object.*—To determine quantitatively the mechanical separates for an expression of the textural characteristics of soils.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Data provided for soil surveys and other activities.

*Assignment.*—W. B. Page and J. W. Bomboy.

*Proposed expenditures, 1914-15.*—\$2,792.66.

**Soil Pressures:**

*Object.*—To determine the magnitude and direction of the soil stresses induced by changing moisture content.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Stresses actually measured and shown to be of great magnitude.

*Assignment.*—L. B. Olmstead.

*Proposed expenditures, 1914-15.*—\$250.

**Translocation of Soil Particles:**

*Object.*—To investigate the relative movements of large and small soil particles under alternate wetting and drying.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—"Natural packing" explained; interchange of soil and subsoil material shown to be continuous; clodding, phenomena of soil drainage, etc., elucidated.

*Assignment.*—L. B. Olmstead.

*Proposed expenditures, 1914-15.*—\$350.

**Soil Erosion:**

*Object.*—To investigate causes for and control of erosion in soils of different types and under various climatic conditions.

*Location.*—Washington, D. C., and field assignments.

*Date begun.*—1913.

*Results.*—Various types of erosion, especially in Southern States, investigated, causes determined, and preventive and remedial methods critically examined.

*Assignment.*—R. O. E. Davis.

*Proposed expenditures, 1914-15.*—\$2,347.50.

**Movement of the Soil Solution:**

*Object.*—To determine the general laws of distribution of the soil moisture.

*Location.*—Washington, D. C.

*Date begun.*—1906.

*Results.*—General law deduced and verified experimentally; distribution of rainfall deduced theoretically and confirmatory experimental data obtained.

*Assignment.*—R. O. E. Davis.

*Proposed expenditures, 1914-15.*—\$1,554.46.

**Soil Hygrometer:**

*Object.*—To utilize the Wheatstone Bridge or other instruments in estimating the water content of soils.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Continued efforts have been made to work out a practical instrument, mainly on the basis of a slide wire bridge.

*Assignment.*—L. B. Olmstead.

*Proposed expenditures, 1914-15.*—\$150.

**Absorption by Soils:**

*Object.*—To determine the effect of various substances upon salts in the fixation of fertilizer constituents by soils.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—General laws deduced in connection with chemical investigation; work temporarily suspended because of limited personnel.

*Proposed expenditures, 1914-15.*—No allotment; work temporarily suspended.

**Soil Temperatures:**

*Object.*—To investigate heat conductance of soils and relation of temperature and solar radiations of soil to soil productivity.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—General laws as influenced by texture and moisture content investigated. Advice based on experimental examination given for a number of special cases met in actual practice by parties seeking assistance from the bureau.

*Assignment.*—R. O. E. Davis and L. B. Olmstead.

*Proposed expenditures, 1914-15.*—\$2,177.40.

**Soil Aeration:**

*Object.*—To investigate changing conditions of soil atmosphere and their effect on productivity.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Observations on the absorption and retention of carbon dioxide made in connection with other subactivities. Work was temporarily suspended for several years because of limited personnel.

*Assignment.*—R. O. E. Davis.

*Proposed expenditures, 1914-15.*—\$2,200.43.

**Total, Soil Physical Investigations,** \$16,131.66 (general expenses, \$15,265; statutory, \$866.66).

**SOIL-FERTILITY INVESTIGATIONS.****Maintenance of Soil Fertility:**

*Object.*—To study problems in the management and upbuilding of specific soil types, the best systems of rotation, and the effect of fertilizers. The work will include laboratory investigations on the composition of humus.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—Information disseminated regarding specific soil types and their management.

*Assignment.*—Oswald Schreiner, E. C. Shorey, and J. J. Skinner.

*Proposed expenditures, 1914-15.*—\$4,346.

**Causes of Unproductive Soils:**

*Object.*—To study organic substances causing infertility, such as result in the failure of specific crops, of orchards, in die-back in citrus groves, etc.

*Cooperation.*—Experiment stations and farmers.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—Several harmful substances isolated and identified; published in *Journal of Agricultural Research*, vol. 1.

*Assignment.*—Oswald Schreiner, E. C. Shorey, E. H. Walters, and A. M. Jackson.

*Proposed expenditures, 1914-15.*—\$5,219.

**Transformation and Formation of Soil Humus by Biochemical Factors:**

*Object.*—To study changes in soil organic matter and the formation of organic compounds by microorganisms and higher plants.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—Organic chemical compounds have been obtained from molds and soils identical in composition, and results applied to formation of humus; published in Technical Journal.

*Assignment.*—Oswald Schreiner, M. X. Sullivan, L. J. Gillespie, and F. R. Reid.

*Proposed expenditures, 1914-15.*—\$6,560.

**Origin of Organic Constituents in Soils:**

*Object.*—To study the chemical transformation of organic matter in soils which result in the formation of the constituents isolated from soils.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—Organic matter added to soils has been found to break down along definite lines yielding compounds some of which had previously been isolated from field soils.

*Assignment.*—Oswald Schreiner, B. E. Brown, and E. C. Lathrop.

*Proposed expenditures, 1914-15.*—\$5,185.

**Means for Improvement of Unproductive Soils:**

*Object.*—To determine fertilizer and lime requirements of soils, the action of compounds isolated from soils, and the effect of fertilizers on these.

*Location.*—Washington, D. C.

*Date begun.*—About 1904.

*Results.*—Information disseminated regarding specific soils, the properties of a considerable number of compounds ascertained, and the results published in technical journals and contained in bulletins in press.

*Assignment.*—Oswald Schreiner, J. J. Skinner, J. H. Beattie, and A. M. Jackson.

*Proposed expenditures, 1914-15.*—\$4,830.

**Effect of Fertilizers and Soil Amendments:**

*Object.*—To study the various soil factors as influenced by fertilizers and soil amendments, such as lime, manganese, etc., in the field and with different crops; to study the effect of known organic soil constituents under field conditions and the influence of fertilizers and soil treatments on their action.

*Cooperation.*—Arlington Farm and experiment stations.

*Location.*—Washington, D. C., and Arlington Farm, Va.

*Date begun.*—About 1904.

*Results.*—Effect of manganese on soils ascertained and results published in Bureau of Soils Bulletin 42; the effect of soil aldehydes on various crops under field conditions ascertained and results published in Bulletin 103.

*Assignment.*—Oswald Schreiner, J. J. Skinner, Henry Winckelmann, F. R. Reid, A. M. Jackson, and J. H. Beattie.

*Proposed expenditures, 1914-15.*—\$6,560.

**Total, Soil-Fertility Investigations, \$32,700 (general expenses).**

**INVESTIGATION OF FERTILIZER RESOURCES.****Administration:**

*Object.*—To direct the investigations of fertilizer resources of the United States and carry on routine laboratory and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—1911.

*Assignment.*—F. K. Cameron.

*Proposed expenditures, 1914-15.*—\$2,716.67 (general expenses, \$1,850; statutory, \$866.67).

**Extraction of Potassium Salts from Kelp:**

*Object.*—To investigate the practicability and economic value of various methods of extracting potassium salts from kelp.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Extraction has been shown to be economically possible.

*Assignment.*—A. R. Merz.

*Proposed expenditures, 1914-15.*—\$200.

**Effect of Harvesting and Other Factors on the Growth of Kelp:**

*Object.*—To determine the effect of harvesting on the growth of kelp.

*Location.*—Washington, D. C., and La Jolla, Cal.

*Date begun.*—1912.

*Results.*—Harvesting, under certain conditions, induces an increased growth; neighborhood of fresh-water streams of little influence; storms frequently destructive of temporary growth.

*Assignment.*—W. C. Crandall.

*Proposed expenditures, 1914-15.*—\$250.

**Fixation of Atmospheric Nitrogen:**

*Object.*—To determine the efficiency of both oxidation and reduction methods of fixing atmospheric nitrogen.

*Location.*—Washington, D. C., and Arlington Farm, Va., and field inspection of existing manufacturing plants.

*Date begun.*—1913.

*Results.*—Preliminary experiments show that improvements can probably be made in methods so far suggested.

*Assignment.*—F. K. Cameron, W. H. Ross, and Harry Bryan.

*Proposed expenditures, 1914-15.*—\$10,825.11.

**Potash from Feldspar:**

*Object.*—To determine commercially possible methods for utilizing feldspar and other silicate minerals as a source for fertilizer production.

*Location.*—Washington, D. C., and Arlington Farm, Va.

*Date begun.*—1912.

*Results.*—The commercial use under certain conditions of feldspar and other silicate minerals as a source of fertilizer has been shown to be feasible.

*Assignment.*—W. H. Ross, Harry Bryan, and R. A. Merz.

*Proposed expenditures, 1914-15.*—\$1,811.60.

**Manufacture of Sulphuric Acid and Acid Phosphate:**

*Object.*—To determine the scientific principles involved, with a view to increasing efficiency and economy of production.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—The importance of lead sulphate in the manufacture of sulphuric acid shown; improvements in the manufacture of superphosphate worked out.

*Assignment.*—W. H. Waggaman.

*Proposed expenditures, 1914-15.*—\$912.25.

**Extraction of Phosphoric Acid from Natural Phosphates:**

*Object.*—To compare the sulphuric acid and electrical methods.

*Location.*—Arlington Farm, Va.

*Date begun.*—1913.

*Results.*—Work just organized.

*Assignment.*—F. K. Cameron, W. H. Ross, and Harry Bryan.

*Proposed expenditures, 1914-15.*—\$3,321.58.

**New Method for Manufacturing Sulphuric Acid:**

*Object.*—To test a proposed modification of the chamber process now in common use, with a view to cheapening the cost of the acid.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Work just organized.

*Assignment.*—W. H. Waggaman.

*Proposed expenditures, 1914-15.*—\$1,102.10.

**Phosphate Industry of the United States:**

*Object.*—To investigate the sources, quantity, and production of phosphate rock, its manipulations for the fertilizer industry, and other factors determining its cost to the farmer.

*Location.*—Washington, D. C., and field assignments.

*Date begun.*—1911.

*Results.*—Summary of present conditions prepared, which is to be kept up to date by periodical revision.

*Assignment.*—C. C. Fletcher, W. H. Waggaman, A. R. Merz, and J. R. Lindemuth.

*Proposed expenditures, 1914-15.*—\$1,300.

**Phosphate Deposits in Virginia:**

*Object.*—To investigate the commercial importance of reported deposits in Albemarle, Nelson, and Roanoke Counties, Va.

*Cooperation.*—State geologist of Virginia.

*Location.*—Washington, D. C., Charlottesville, Va., and field assignments.

*Date begun.*—1913.

*Results.*—Field inspection and laboratory examination of samples show some economic possibilities.

*Assignment.*—W. H. Waggaman, J. A. Cullen, and A. R. Merz.

*Proposed expenditures, 1914-15.*—\$200.

**Concentration of Low-Grade Phosphates:**

*Object.*—To determine method of conserving mine wastes.

*Location.*—Washington, D. C., and field assignments.

*Date begun.*—1913.

*Results.*—Work just organized.

*Assignment.*—W. H. Waggaman, and J. A. Culien.

*Proposed expenditures, 1914-15.*—\$3,424.

**Laboratory for Electrical Furnace Work:**

*Object.*—To investigate methods of fertilizer production involving heavy-current apparatus. A laboratory for this purpose will be constructed.

*Location.*—Washington, D. C., and Arlington Farm, Va.

*Date begun.*—1913.

*Results.*—Work just organized.

*Probable date of completion.*—December 1, 1914.

*Assignment.*—F. K. Cameron, Harry Bryan, and W. H. Ross.

*Proposed expenditures, 1914-15.*—\$5,280.

**Production of Raw Materials in the United States for Fertilizer Manufacture:**

*Object.*—To obtain accurate and authentic data, by correspondence with producers and by occasional visits to mines and factories, regarding resources available or partially available.

*Cooperation.*—Miners and manufacturers.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Summaries made, which will be periodically revised.

*Assignment.*—C. C. Fletcher.

*Proposed expenditures, 1914-15.*—\$480.

**Fertilizer Value of Garbage and City Wastes:**

*Object.*—To determine the amount and value of city wastes as sources of commercial fertilizer material.

*Location.*—Washington, D. C., and field assignments.

*Date begun.*—1913.

*Results.*—Field investigation and laboratory examination of samples now in progress.

*Assignment.*—J. W. Turrentine and J. R. Lindemuth.

*Proposed expenditures, 1914-15.*—\$5,543.36.

**Total, Investigation of Fertilizer Resources, \$37,366.67** (general expenses, \$36,500; statutory, \$866.67).

**SOIL-SURVEY INVESTIGATIONS. ✓****Administration:**

*Object.*—To plan and direct all field activities connected with soil-survey investigations as well as conduct correspondence and supervise general office work.

*Cooperation.*—Various bureaus of the department and State organizations.

*Location.*—Washington, D. C.

*Date begun.*—1898.

*Assignment.*—Curtis F. Marbut.

*Proposed expenditures, 1914-15.*—\$8,150 (general expenses, \$4,950; statutory, \$3,200).

SOIL-SURVEY AREAS.<sup>1</sup>

| Location.                   | Cooperation.  | Date begun.      | Area surveyed.           | Probable date of completion. | Assignment.                              | Proposed expenditures, 1914-15. |
|-----------------------------|---|------------------|--------------------------|------------------------------|--|---------------------------------|
| Barbour County, Ala.        | Alabama Department of Agriculture and Industries and Agricultural Experiment Station. | 1914             | <i>Sq. miles.</i><br>312 | Jan. 1, 1915                 | H. C. Smith <sup>2</sup> .....           | \$2,100                         |
| Limestone County, Ala.      | .....do.....  | 1913             | 546                      | Aug. 1, 1914                 | R. T. A. Burke <sup>2</sup> ...          | 410                             |
| Washington County, Ala.     | .....do.....  | 1913             | 287                      | June 30, 1915                | L. A. Hurst <sup>2</sup> .....           | 2,940                           |
| Columbia County, Ark.       | Arkansas Agricultural Experiment Station.   | 1913             | 585                      | Aug. 20, 1914                | C. Lounsbury and E. B. Deeter.           | 820                             |
| Yell County, Ark.           | .....do.....  | ( <sup>3</sup> ) | .....                    | June 30, 1915                | .....do.....                             | 3,820                           |
| Honey Lake District, Cal.   | University of California and agricultural experiment station.                         | 1914             | 75                       | Oct. 31, 1914                | E. C. Eckman <sup>2</sup> ...            | 480                             |
| Russian River Valley, Cal.  | University of California and agricultural experiment station.                         | 1914             | 160                      | Oct. 31, 1914                | E. B. Watson <sup>2</sup> ...            | 1,120                           |
| Dekalb County, Ga.          | Georgia State College of Agriculture.   | 1914             | 50                       | Aug. 31, 1914                | G. A. Crabb <sup>2</sup> .....           | 450                             |
| Jackson County, Ga.         | .....do.....  | 1914             | 160                      | Aug. 20, 1914                | M. Baldwin <sup>2</sup> .....            | 420                             |
| Polk County, Ga.            | .....do.....  | ( <sup>4</sup> ) | .....                    | Nov. 20, 1914                | .....do. <sup>2</sup> .....              | 770                             |
| Latah County, Idaho.        | Idaho Agricultural Experiment Station.  | ( <sup>5</sup> ) | .....                    | June 30, 1915                | J. H. Agee <sup>2</sup> .....            | 2,100                           |
| Clinton County, Ind.        | Indiana Geological Survey.  | 1914             | .....                    | Dec. 31, 1914                | W. E. Tharp <sup>2</sup> .....           | 1,470                           |
| Elkhart County, Ind.        | .....do.....  | 1914             | .....                    | .....do.....                 | G. B. Jones <sup>2</sup> .....           | 1,470                           |
| Warren County, Ind.         | .....do.....  | 1914             | 68                       | Oct. 10, 1914                | E. H. Stevens <sup>2</sup> ....          | 710                             |
| Lee County, Iowa.           | Iowa State College of Agriculture and experiment station.                             | 1914             | 86                       | Dec. 15, 1914                | L. V. Davis <sup>2</sup> .....           | 1,260                           |
| Muscatine County, Iowa.     | .....do.....  | 1914             | .....                    | .....do.....                 | H. W. Hawker <sup>2</sup> ..             | 1,200                           |
| Pottawattamie County, Iowa. | .....do.....  | 1914             | 42                       | June 30, 1915                | A. L. Goodman <sup>2</sup> ..            | 1,980                           |
| Webster County, Iowa.       | .....do.....  | 1914             | .....                    | Dec. 10, 1914                | J. O. Veatch <sup>2</sup> .....          | 1,500                           |
| Cowley County, Kans.        | Kansas State Agricultural College and experiment station.                             | 1914             | .....                    | June 30, 1915                | E. C. Hall and Roy Hall. <sup>2</sup>    | 2,340                           |
| Montgomery County, Md.      | Maryland Geological Survey.   | 1914             | 51                       | Dec. 15, 1914                | W. T. Carter, jr. <sup>2</sup> ..        | 1,560                           |
| Pennington County, Minn.    | .....do.....  | 1913             | 347                      | Oct. 1, 1914                 | W. G. Smith and N. M. Kirk.              | 1,390                           |
| Chickasaw County, Miss.     | Mississippi Geological Survey.  | ( <sup>6</sup> ) | .....                    | Dec. 31, 1914                | C. S. Waldrop <sup>2</sup> ...           | 1,320                           |
| Dunklin County, Mo.         | University of Missouri and agricultural experiment station.                           | 1913             | 330                      | Dec. 1, 1914                 | One of the parties working in the State. | 400                             |
| Grundy County, Mo.          | .....do.....  | 1914             | 163                      | Nov. 1, 1914                 | A. T. Sweet <sup>2</sup> .....           | 1,080                           |
| Harrison County, Mo.        | .....do.....  | 1914             | 321                      | Dec. 10, 1914                | E. S. Vanatta <sup>2</sup> ...           | 1,260                           |
| Johnson County, Mo.         | .....do.....  | 1914             | 131                      | Dec. 30, 1914                | B. W. Tillman <sup>2</sup> ..            | 1,440                           |

<sup>1</sup> The object of all these surveys is the same, "to map and classify soils." All mentioned in the table are detailed surveys except the two last mentioned, San Francisco Bay district, California, and central northern Wisconsin, which are reconnaissance surveys.

<sup>2</sup> Assisted by State representative.

<sup>3</sup> Work will start about Aug. 15, 1914.

<sup>4</sup> Will be started about Sept. 1, 1914.

<sup>5</sup> Will be started about July 1, 1914.

## Soil-survey areas—Continued.

| Location.   | Cooperation.   | ate<br>gun. | Area sur-<br>veyed.      | Probable date<br>of completion. | Assignment.  | Proposed<br>expendi-<br>tures,<br>1914-15. |
|---|--|-------------|--------------------------|---------------------------------|--|--|
| Pettis County, Mo..                                     | University of Missouri and agricultural experiment station.                                | 1914        | <i>Sq. miles.</i><br>177 | Dec. 15, 1914                   | R. F. Rogers <sup>1</sup> ....   | 1,140                                      |
| Bitter Root Val-<br>ley, Mont.                          | .....  | 1914        | 171                      | Nov. 1, 1914                    | E. C. Eckman....   | 520  |
| Gage County, Nebr.                                      | University of Nebraska.  | 1914        | 162                      | Dec. 1, 1914                    | R. R. Burn <sup>1</sup> ....   | 1,040                                      |
| Nemaha County,<br>Nebr.                                 | .....do.....   | (2)         | .....                    | Dec. 15, 1914                   | A. H. Meyer <sup>1</sup> ....  | 1,380                                      |
| Seward County,<br>Nebr.                                 | University of Nebraska.  | 1914        | 74                       | .....do.....                    | E. H. Smies <sup>1</sup> ....  | 1,040                                      |
| Thurston County,<br>Nebr.                               | .....do.....   | (3)         | .....                    | Nov. 20, 1914                   | M. W. Beck <sup>1</sup> ....   | 700  |
| Camden area, N. J..                                     | Agricultural exper-<br>iment station and New<br>Jersey geological survey.                  | 1914        | 40                       | June 30, 1915                   | A. L. Patrick <sup>1</sup> ....  | 1,740                                      |
| Chautauqua<br>County, N. Y.                             | New York State<br>College of Agriculture.  | 1913        | 562                      | Dec. 15, 1914                   | T. M. Morrison <sup>1</sup> ..   | 1,220                                      |
| Clinton County,<br>N. Y.                                | .....do.....   | 1914        | 49                       | June 30, 1915                   | E. T. Maxon <sup>1</sup> ....  | 1,980                                      |
| Lincoln County,<br>N. C.                                | North Carolina<br>department of agricul-<br>ture and agricultural ex-<br>periment station. | (4)         | .....                    | Feb. 1, 1915                    | Undetermined....   | 1,000                                      |
| Rowan County,<br>N. C.                                  | .....do.....   | 1914        | 64                       | Nov. 15, 1914                   | R. B. Hardison <sup>1</sup> ..   | 1,300                                      |
| Union County, N. C                                      | .....do.....   | 1914        | 190                      | .....do.....                    | B. B. Derrick <sup>1</sup> ....  | 1,020                                      |
| Wake County, N. C                                       | .....do.....   | 1912        | 666                      | Aug. 20, 1914                   | L. L. Brinkley,<br>State representa-<br>tive.                                      | .....                                      |
| Dickey County,<br>N. Dak.                               | North Dakota<br>agricultural exper-<br>iment station.                                      | (5)         | .....                    | June 30, 1915                   | F. Z. Hutton and<br>T. M. Bushnell. <sup>1</sup>                                   | 2,090                                      |
| Lamoure County,<br>N. Dak.                              | .....do.....   | 1913        | 452                      | Oct. 1, 1914                    | .....do.....   | 1,330                                      |
| Paulding County<br>Ohio.                                | Ohio Agricultural<br>Experiment Station.   | 1914        | .....                    | Dec. 1, 1914                    | H. G. Lewis <sup>1</sup> ....  | 950  |
| Portage County,<br>Ohio.                                | .....do.....   | 1914        | .....                    | Dec. 15, 1914                   | C. N. Mooney <sup>1</sup> ....   | 1,200                                      |
| Trumbull County,<br>Ohio.                               | .....do.....   | 1914        | .....                    | Dec. 31, 1914                   | J. M. Snyder <sup>1</sup> ....   | 1,500                                      |
| Roger Mills Coun-<br>ty, Okla.                          | .....  | 1913        | 578                      | Nov. 1, 1914                    | J. A. Kerr.....  | 1,440                                      |
| Lancaster County,<br>Pa.                                | Pennsylvania<br>State College and agricul-<br>tural experiment<br>station.                 | 1913        | 550                      | .....do.....                    | B. D. Gilbert <sup>1</sup> ....  | 1,220                                      |
| Frederick County,<br>Va.                                | Virginia agricul-<br>tural exper-<br>iment station.  | 1914        | 45                       | Nov. 20, 1914                   | J. B. R. Dickey<br>and W. B. Cobb.   | 1,850                                      |
| Franklin County,<br>Wash.                               | Washington Geo-<br>logical Survey.   | 1914        | 326                      | Dec. 15, 1914                   | C. Van Duyne <sup>1</sup> ...  | 1,410                                      |
| McDowell, Wyom-<br>ing, and Raleigh<br>Counties, W. Va. | West Virginia<br>Geological Sur-<br>vey.   | (3)         | .....                    | .....do.....                    | W. J. Latimer....  | 1,000                                      |
| San Francisco Bay<br>District, Cal.                     | University of<br>California and agricul-<br>tural exper-<br>iment station.                 | 1914        | 817                      | Oct. 31, 1914                   | M. H. Lapham<br>and L. C. Holmes. <sup>1</sup>                                     | 2,020                                      |
| Central northern<br>Wisconsin.                          | Wisconsin Geo-<br>logical and Nat-<br>ural History<br>Survey.                              | 1914        | 534                      | Nov. 15, 1914                   | W. J. Geib, L. R.<br>Schoenmann, A.<br>E. Taylor, and<br>C. Thompson. <sup>1</sup> | 4,560                                      |
| Winter and spring<br>assignments.                       | To be determined<br>later.   | .....       | .....                    | .....                           | .....  | 60,230                                     |

<sup>1</sup> Assisted by State representative.<sup>2</sup> Will be started about Oct. 1, 1914.<sup>3</sup> Will be started about July 1, 1914.<sup>4</sup> Will be started summer or fall of 1914.<sup>5</sup> Undetermined.

**Classification of Irrigated Land:**

*Object.*—To assist the United States Reclamation Service in classifying land for irrigation purposes.

*Cooperation.*—Reclamation Service.

*Location.*—Powell, Wyo., and southern Texas.

*Date begun.*—1914.

*Assignment.*—A. T. Strahorn.

*Proposed expenditures, 1914-15.*—\$3,000.

**Correlation of Soils and Supervision of Field Work:**

*Object.*—To correlate the soils of all areas surveyed so as to insure the proper classification of the soils of the United States; inspect all work of the soil-survey field parties; examine and correct area reports and prepare memoranda for final soil correlation.

*Cooperation.*—All State cooperating institutions.

*Location.*—Washington, D. C. The inspection force is assigned to specific soil survey areas, spending most of their time in the field.

*Date begun.*—1898.

*Assignment.*—H. H. Bennett, M. H. Lapham, W. E. Hearn, T. D. Rice, and W. E. McLendon.

*Proposed expenditures, 1914-15.*—\$21,070 (general expenses, \$16,010; statutory, \$5,060).

**Map Drafting:**

*Object.*—To prepare and reconstruct base maps; secure miscellaneous data for the use of soil-survey parties; adjust, compile, redraw, and color from the original field sheets and notes of the soil-survey parties, maps to be used as copy in lithographic reproduction; measure the area of the different soil types; prepare drawings for illustrating reports; draw specifications for the lithographic work and proof read the copy furnished by the Public Printer.

*Cooperation.*—Correspondence now being conducted with the Geological Survey with a view to cooperation in base-map making.

*Location.*—Washington, D. C.

*Date begun.*—1898.

*Results.*—Preparation of 51 soil maps of areas surveyed; 51 sketch maps to accompany reports on soil surveys; 10 page plates; 2 farm maps; 1 large map for exhibition purposes; also miscellaneous drafting and lettering for laboratories and office.

*Assignment.*—C. A. Drake.

*Proposed expenditures, 1914-15.*—\$13,400 (general expenses, \$1,600; statutory, \$11,800).

**Photographic Reproduction of Base Maps:**

*Object.*—To enlarge or reproduce base maps to a scale suitable for the use of soil-survey parties or the drafting force by photographic process.

*Location.*—Washington, D. C.

*Date begun.*—1898.

*Results.*—Reproduced and mounted county maps for field use; developing negatives and making prints for use of bureau and in reports. Miscellaneous work for other bureaus.

*Assignment.*—R. J. Bonde.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses, \$800; statutory, \$1,200).

**Special Soil Studies:**

*Object.*—To investigate the relations of soils to crops and prepare monographs treating of important soil series.

*Cooperation.*—Bureau of Plant Industry, experiment stations, and other agricultural organizations.

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1911.

*Results.*—Preparation of bulletins on fruit soils of southern New England; also on reports on Miami, Clyde, and Norfolk series of soils. The work will be extended to Hagerstown and other soil series, important trucking and fruit soils.

*Assignment.*—J. A. Bonsteel, H. J. Wilder.

*Proposed expenditures, 1914-15.*—\$8,450 (general expenses, \$7,250; statutory, \$1,200).

**Advisory Service:**

*Object.*—To answer correspondence relating to soils and advise as to their use.

*Cooperation.*—All bureaus of the department.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Information given great number of applicants making inquiry relating to correlation and use of soils.

*Assignment.*—J. E. Lapham.

*Proposed expenditures, 1914-15.*—\$2,500.

**Supplies:**

*Object.*—To purchase plane tables, compasses, augers, alidades, and other instruments and material in common use in soil-survey work.

*Location.*—Washington, D. C.

*Date begun.*—1898.

*Proposed expenditures, 1914-15.*—\$3,000.

**Total, Soil-Survey Investigations,** \$192,260 (general expenses, \$169,800; statutory, \$22,460).

**CLASSIFICATION OF AGRICULTURAL LANDS IN FOREST RESERVES.****Forest Land Classification:**

*Object.*—To assist the Forest Service in the classification and segregation of agricultural lands in the national forests.

*Cooperation.*—Forest Service.

*Location.*—In the several forest reserves.

*Date begun.*—September, 1912.

*Results.*—Various projects examined and results furnished the Forest Service.

Results not published by this bureau.

*Assignment.*—W. H. Heileman, J. E. Dunn, R. A. Winston, and A. E. Kocher.

*Proposed expenditures, 1914-15.*—\$20,000 (general expenses).

**BUREAU OF ENTOMOLOGY.****GENERAL BUREAU ADMINISTRATION.****Office of Chief:**

*Object.*—General administration, supervision, and direction of the investigations and business activities of the bureau.

*Cooperation.*—All the bureaus of the department, other executive departments, and State institutions.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—L. O. Howard.

*Proposed expenditures, 1914-15.*—\$3,300 (statutory).

**Office of Chief Clerk:**

*Object.*—The chief clerk is the executive officer of the bureau, charged with carrying out the directions of the chief, as these relate to supervision of clerical work, care of offices and records, and handling of accounts, correspondence, property, and supplies.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—R. S. Clifton.

*Proposed expenditures, 1914-15.*—\$7,950 (statutory).

**Accounts Section:**

*Object.*—To keep records of financial operations of the bureau.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—E. B. O'Leary.

*Proposed expenditures, 1914-15.*—\$6,000 (statutory).

**Library:**

*Object.*—To conduct work incidental to maintenance of library of entomological literature.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—Mabel Colcord.

*Proposed expenditures, 1914-15.*—\$3,360 (statutory).

**Supply Section:**

*Object.*—The purchase, custody, distribution, and record of all equipment and materials for field and office use.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—B. S. Walker.

*Proposed expenditures, 1914-15.*—\$4,000 (statutory).

**Editorial Section:**

*Object.*—To conduct the editorial work of the bureau and facilitate the publication of the results of entomological investigations.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—B. A. Reynolds.

*Proposed expenditures, 1914-15.*—\$2,300 (statutory).

**Files and Records Section:**

*Object.*—Filing of all correspondence pertaining to the operations of the bureau.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—T. A. Keleher.

*Proposed expenditures, 1914-15.*—\$2,300 (statutory).

**Total, General Bureau Administration, \$32,210 (statutory).**

**DECIDUOUS-FRUIT INSECT INVESTIGATIONS.****SUPERVISION.****Supervision:**

*Object.*—To plan and direct the work pertaining to deciduous-fruit insect investigations, including expansion of general office work, correspondence, etc.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—A. L. Quaintance.

*Proposed expenditures, 1914-15.*—\$6,600 (general expenses, \$4,000; statutory, \$2,600).

**APPLE INSECT INVESTIGATIONS.****Apple-Tree Borer:**

*Object.*—To determine the life histories and habits of the various species of apple-tree borers, and to develop appropriate remedies therefor.

*Location.*—French Creek, W. Va.

*Date begun.*—1911.

*Results.*—The biology of several species of borers have been worked out, and other species are under investigation. Many preparations have been and are being tested as remedies, some of which are effective in preventing infestation by certain species.

*Probable date of completion.*—1916.

*Assignment.*—Fred E. Brooks.

*Proposed expenditures, 1914-15.*—\$2,800 (general expenses).

**Apple Plant Lice:**

*Object.*—To determine life histories of and remedies for apple-plant lice, such as the woolly apple aphid, green apple aphid, rosy apple aphid, etc.

*Location.*—Vienna and Winchester, Va.

*Date begun.*—1912.

*Results.*—The biology of the woolly apple aphid has been thoroughly determined, and work is now in progress on other important species, as the rosy apple aphid, green apple aphid, etc. Experiments with sprays in orchards indicate effective control by timely use of sprays, especially nicotine sprays.

*Probable date of completion.*—1918.

*Assignment.*—A. C. Baker.

*Proposed expenditures, 1914-15.*—\$5,500 (general expenses).

**Codling Moth:**

*Object.*—To determine what variations are necessary in spraying schedule to control the codling moth in such widely separated fruit districts as Maine, Arkansas, Michigan, New Mexico, California, the Allegheny region, etc.

*Location.*—Roswell, N. Mex., and Winthrop, Me. If feasible, work to be later extended to Georgia, Colorado, and Washington State.

**Codling Moth—Continued.**

*Date begun.*—1908.

*Results.*—Work has been completed in Michigan, Pennsylvania, Arkansas, Allegheny region, and California, and reports have been issued for these regions.  
*Probable date of completion.*—1918.

*Assignment.*—E. W. Geyer, F. L. Simanton.

*Proposed expenditures, 1914-15.*—\$8,210.36 (general expenses).

**Relation of Insects to Stigmonose:**

*Object.*—To determine relation of insects, especially Hemipterous insects, to the affection of apples known as "Stigmonose."

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Wenatchee, Wash.

*Date begun.*—May, 1914.

*Probable date of completion.*—1916.

*Assignment.*—E. J. Newcomer.

*Proposed expenditures, 1914-15.*—\$2,400 (general expenses.)

**Total, Apple Insect Investigations, \$18,910.36 (general expenses).**

**PEACH INSECT INVESTIGATIONS.****Peach Borer:**

*Object.*—To determine the life history and habits of the peach-tree borer, and to develop appropriate remedies therefor.

*Location.*—Winchester, Va., and Washington, D. C.

*Date begun.*—1911.

*Results.*—The biology, food plants, etc., of the peach borer have been pretty well determined for different parts of the country where peaches are grown. Many washes and practices recommended for its control have been tried, many of which have been found without value. Experiments now under way give promise of developing a successful treatment.

*Probable date of completion.*—1916.

*Assignment.*—E. B. Blakeslee, W. B. Wood.

*Proposed expenditures, 1914-15.*—\$3,900 (general expenses).

**Pear Thrips:**

*Object.*—To conduct experiments in the control of pear thrips.

*Location.*—Walnut Creek, Cal.

*Date begun.*—1907.

*Results.*—The biology of the pear thrips has been thoroughly worked out and published upon. An effective spray treatment has been developed and is in general use. A cheaper spray is under investigation; also tests of sprays combined with fungicides.

*Probable date of completion.*—1915.

*Assignment.*—R. L. Nougaret, W. M. Davidson.

*Proposed expenditures, 1914-15.*—\$1,269 (general expenses).

**Total, Peach Insect Investigations, \$5,169 (general expenses).**

**GRAPE INSECT INVESTIGATIONS.****Grape Phylloxera:**

*Object.*—To determine the life history of grape Phylloxera under California conditions, means of dispersal, comparative resistance to Phylloxera of different varieties of grapes, and possibilities of renovation of old infested vineyards.

*Cooperation.*—Bureau of Plant Industry (varietal resistance).

*Location.*—Walnut Creek, Cal.

*Date begun.*—1912.

*Results.*—Biological studies of Phylloxera are fairly well completed. A large amount of data on success of aphid colonies on roots of different varieties of grapes has been accumulated. Experiments in renovating Phylloxera-infested vineyards thus far made indicate much benefit from methods employed.

*Probable date of completion.*—1915.

*Assignment.*—R. L. Nougaret, W. M. Davidson.

*Proposed expenditures, 1914-15.*—\$3,840 (general expenses).

**Grape Berry Moth and Miscellaneous Grape Insects:**

*Object.*—To determine the life history and habits of the grape berry moth and other important insects affecting the grape; to develop remedies to be employed in their control.

*Location.*—North East, Pa.

*Date begun.*—1907.

*Results.*—Many data on the biology of the grape berry moth have been obtained and a publication issued. Life histories and habits of several important grape pests have been determined, effective remedies developed, and publications issued.

*Assignment.*—Dwight Isely.

*Proposed expenditures, 1914-15.*—\$2,785 (general expenses).

**Total, Grape Insect Investigations, \$6,625 (general expenses).**

**NUT INSECT INVESTIGATIONS.****Pecan Insects:**

*Object.*—To determine biologies of and remedies for the principal pecan insects. *Location.*—Monticello, Fla. To be extended to principal pecan-growing regions in the South.

*Date begun.*—1913.

*Results.*—A large amount of data on important pecan insects has been accumulated. Manuscript on the case bearer is now in preparation. Experiments with sprays applied with high-power sprayers show the practicability of this work in many instances.

*Probable date of completion.*—1916.

*Assignment.*—J. B. Gill.

*Proposed expenditures, 1914-15.*—\$3,972 (general expenses).

**INVESTIGATIONS OF ORCHARD INSECTICIDES AND SPRAYING MACHINERY.****Insecticide Investigations:**

*Object.*—To determine the comparative value of insecticides in general use and to what extent same may be combined with different fungicides in control of insect plant pests; to develop new insecticides and determine their value in insect control and their effect on plants treated.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Benton Harbor, Mich., and Bentonville, Ark.

*Date begun.*—1912.

*Results.*—Tests have been made in orchards of most types of commercial insecticides, and their relative merits determined. New commercial insecticides are tested as far as practicable, as they appear from year to year. Feeding experiments have been made with many toxic substances to determine their usefulness as insecticides.

*Assignment.*—E. H. Siegler.

*Proposed expenditures, 1914-15.*—\$3,400 (general expenses).

**Spraying Apparatus and Spraying Efficiency in Relation to Deciduous Fruits:**

*Object.*—To investigate in orchards and factories the relative efficiency of the many types of spraying apparatus now on the market, noting especially principles of construction, types of gasoline motors, pumps, etc. Attention will be given to determining durability of materials used in pumps, as affected by various spray liquids, methods of packing of valves, and other practical points. It is believed that such inquiry will result in definite conclusions as to the most economical type of spraying apparatus for given kinds of service. It is also planned to make a census of spraying efficiency as practiced by various orchardists, vinyardists, etc., as a basis for suggestions for improvements in such work.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—July, 1914.

*Assignment.*—A. L. Quaintance.

*Proposed expenditures, 1914-15.*—\$2,473.64 (general expenses).

**Total, Investigations of Orchard Insecticides and Spraying Machinery, \$5,873.64 (general expenses).**

## CRANBERRY AND SMALL-FRUIT INSECT INVESTIGATIONS.

**Cranberry Insects:**

*Object.*—To study insects affecting the cranberry and determine value of control measures in regard to the flooding of bogs now in vogue; to improve methods employed and determine additional remedies when necessary.

*Location.*—Pemberton, N. J. If feasible, work to be extended to other cranberry-growing sections on the Atlantic seaboard.

*Date begun.*—1913.

*Results.*—Data are being accumulated on the important cranberry insects in New Jersey and the effectiveness of flooding of bogs and other control methods employed. Improvement has been effected in insecticidal sprays used.

*Probable date of completion.*—1918.

*Assignment.*—H. B. Scammell.

*Proposed expenditures, 1914-15.*—\$3,400 (general expenses).

## CONTROL OF DECIDUOUS-FRUIT INSECTS BY NATURAL AGENCIES.

**Control of Deciduous-Fruit Insects by Natural Agencies:**

*Object.*—To determine the importance of hymenopterous parasites in the control of deciduous-fruit insect pests, and, if possible, devise methods for their practical propagation and dissemination.

*Location.*—North East, Pa.

*Date begun.*—1911.

*Results.*—Biological data have been obtained on several important parasites of deciduous-fruit insects as a basis for their intelligent propagation. Many new parasites have been discovered and their economic status determined.

*Assignment.*—R. A. Cushman.

*Proposed expenditures, 1914-15.*—\$3,400 (general expenses).

## ORCHARD INSECT SURVEY.

**Orchard Insect Survey:**

*Object.*—To obtain information on the large number of insect pests of orchards, vineyards, etc., at present of lesser importance in the United States, but which may become important at any time. Specimens of insects secured to be reared in insectary in Washington and appropriate notes and photographs made.

*Location.*—Washington, D. C.

*Date begun.*—Work of this character in progress for many years.

*Results.*—A large amount of information has been accumulated on miscellaneous insects of the orchard, vineyard, etc., in the United States. Specimens of many of these are in the collection for use in making drawings, descriptions, etc. A large collection of notes and photographs is already filed and is being rapidly enlarged.

*Assignment.*—J. F. Strauss, J. H. Paine.

*Proposed expenditures, 1914-15.*—\$4,450 (general expenses).

## DECIDUOUS-FRUIT NURSERY INSECT INVESTIGATIONS.

**Deciduous-Fruit Nursery Insect Investigation:**

*Object.*—To investigate the various insects affecting nursery stock and to develop remedies which may be effectively applied under nursery conditions; to investigate the efficiency of fumigation methods now employed by nurserymen; and to effect improvements in methods of disinfecting nursery stock.

*Location.*—Washington, D. C.

*Date begun.*—July 1, 1914.

*Assignment.*—A. L. Quaintance.

*Proposed expenditures, 1914-15.*—\$2,200 (general expenses).

**Total, Deciduous-Fruit Insect Investigations,** \$60,600 (general expenses, \$58,000; statutory, \$2,600).

## CEREAL AND FORAGE INSECT INVESTIGATIONS.

## SUPERVISION.

**Supervision:**

*Object.*—To plan and direct the activities relating to cereal and forage insect investigations, including supervision of scientific work, general office routine, correspondence, etc.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—F. M. Webster.

*Proposed expenditures, 1914-15.*—\$7,700 (general expenses, \$4,700; statutory, \$3,000).

## CEREAL INSECT INVESTIGATIONS.

**Hessian Fly:**

*Object.*—To study the life history, development, and distribution of the parasites of Hessian fly in order that their services may be artificially utilized more intelligently; to determine the cause of the nonoccurrence and excessive abundance of Hessian fly under agricultural conditions that would seem to favor its development; to determine varieties of grain least subject to attack.

*Cooperation.*—University of South Carolina furnishes laboratory; Bureau of Plant Industry.

*Location.*—Eastern United States, middle United States, California, Oregon, and Washington.

*Date begun.*—1905.

*Results.*—Sufficient progress has been made to enable farmers to time the sowing of their grain in the fall during seasons of normal precipitation, so as to escape fall attacks of the pest.

*Assignment.*—Geo. I. Reeves, P. H. Timberlake, T. D. Urbahns, E. O. G. Kelly.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Dipterous Enemies of Grains Other than the Hessian Fly:**

*Object.*—To determine accurately other species of fly attacking wheat and other grains, but whose ravages are charged to Hessian fly, and thereby devising preventive measures directed more definitely against such pests.

*Cooperation.*—Purdue University, Lafayette, Ind., furnishes laboratory.

*Location.*—Various field stations throughout the grain-growing sections of the United States.

*Date begun.*—1884.

*Results.*—A considerable number of dipterous species and to some extent their methods of work have been studied, with the result that a number supposed to be native to America are now known to be European species and long known to have injured grain in the British Islands, western Europe, and western Asia.

*Assignment.*—J. M. Aldrich, C. W. Creel, C. N. Ainslie.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Cutworms:**

*Object.*—To investigate the life history and habits of all species of cutworms in the United States affecting corn and grass, together with their parasites and other natural enemies.

*Location.*—This work will be carried on at temporary and other field stations throughout the United States.

*Date begun.*—1912.

*Results.*—Progress has been made in the study of a number of species, notably such as have evidently crossed the border from Mexico and occur only in the extreme southern section of the country. A number of supposed western species have been found to simply constitute varieties of the same with no difference in habits and would therefore be amenable to the same measures for prevention or control.

*Assignment.*—F. M. Webster and field assistants.

*Proposed expenditures, 1914-15.*—\$4,000 (general expenses).

**Corn-Leaf Aphis:**

*Object.*—To determine relation of the corn-leaf aphis (*Aphis maidis*) to other similar species; methods of control, especially along the southern border of the country, where, instead of attacking corn as in the North, it attacks and destroys young growing barley, in some localities preventing the cultivation of that crop.

*Location.*—Brownsville, Tex.; Tempe, Ariz.; Glendale, Cal.; Wellington, Kans.; Lakeland, Fla.; Nashville, Tenn.; Columbia, S. C.; St. Louis, Mo.

*Date begun.*—1911.

**Corn-Leaf Aphis—Continued.**

*Results.*—Continuous studies have been carried on, with the result of determining that, while this is fundamentally a corn insect, it as a matter of fact becomes a barley insect and seriously damages that crop throughout the country bordering the Rio Grande River and Mexico. The information so far indicates that the species does not winter north of southern Florida and the southern portions of the country where it is at present being studied, and that as the season advances in spring it gradually makes its way northward.

*Probable date of completion.*—1916.

*Assignment.*—R. A. Vickery, V. L. Wildermuth, R. N. Wilson.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Fungous Enemies of the Chinch Bug:**

*Object.*—To determine whether fungous enemies can be used artificially to advantage in overcoming an invasion of the chinch bug.

*Location.*—Wellington, Kans.

*Date begun.*—Many years ago, but practical value of work still unsettled.

*Results.*—A vast amount of material has been secured, consisting of young chinch bugs that have been exposed during different periods to infection by *Sporotrichum*; also other stages of the insect have been similarly exposed, the material preserved, and sections of a part of it made. It has not been possible, for lack of time, to have all of this material mounted in microscope slides and carefully studied to determine whether a sufficiently complete series has been secured to actually disprove infestation of living insects. Some points remain to be definitely settled.

*Probable date of completion.*—1915.

*Assignment.*—E. O. G. Kelly, Vernon King.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Mechanical Destruction of Hibernating Chinch Bugs:**

*Object.*—To determine the efficiency of burning grass during winter and early spring, and other mechanical methods of destroying hibernating chinch bugs and of preventing the migration of these insects from one field to another.

*Location.*—Throughout the United States.

*Date begun.*—1911.

*Results.*—Enough progress has been made to show that invasions of chinch bugs may in all probability be prevented by careful and systematic burning of certain dead vegetation during the early winter, which has been shown to be preferable to later burnings. In both Oklahoma and Kansas days have been designated for this purpose as "burning days."

*Probable date of completion.*—1915.

*Assignment.*—E. O. G. Kelly, Vernon King.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Western Corn Rootworm:**

*Object.*—To find some practical means of preventing the corn root worm in sections subject to annual overflow of streams.

*Location.*—Nashville, Tenn.; Greenwood, Miss.; Columbia, S. C.; Charlottesville Va.; Wellington, Kans.; Lafayette, Ind.; Elk Point, S. Dak.

*Date begun.*—1912.

*Results.*—Some definite results have been obtained in South Dakota and Nebraska, where the agricultural conditions and methods differ somewhat from those east of the Mississippi River, which may necessitate a different mode of procedure. Also the pest has been traced throughout the bottom lands along rivers of Kentucky and Tennessee, where the insect was not previously supposed to exist. The work involving overflow conditions can, of course, only be carried on when and where these conditions obtain.

*Assignment.*—G. G. Ainslie, J. J. Davis, C. N. Ainslie, Vernon King.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Southern Corn Rootworm:**

*Object.*—To devise methods for protecting the corn crop in the Southern States from the ravages of the rootworm.

*Cooperation.*—University of South Carolina furnishes laboratory quarters for one assistant.

*Location.*—Lakeland, Fla.; Columbia, S. C.; Nashville, Tenn.; Charlottesville, Va.; Brownsville, Tex.; Wellington, Kans.

*Date begun.*—1913.

**Southern Corn Rootworm—Continued.**

*Results.*—Considerable progress has been made looking toward a curtailing of the damage by this pest by advising the planting of corn in spring on certain dates corresponding to certain degrees of latitude and extending from the south northward, with a view to bringing the plants above ground after the females have deposited their eggs in the spring.

*Probable date of completion.*—About 1916.

*Assignment.*—G. G. Ainslie, E. H. Gibson, W. R. McConnell, Vernon King.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Colorado Corn Rootworm:**

*Object.*—To study the life history and natural diffusion of the species and the conditions under which it may attack growing corn; to ascertain difference in the work of this insect and that of closely allied species; and to find out whether the same methods of suppression are applicable to its control.

*Location.*—Koehler, N. Mex.; Wellington, Kans.; Salt Lake City, Utah; Elk Point, S. Dak.

*Date begun.*—1913.

*Results.*—Progress has been made in the mapping out of the distribution of the insect and of studying the methods of attack of the larvæ in the fields, both of which are necessary in order to be able to carry out intelligent field experiments.

*Probable date of completion.*—1915.

*Assignment.*—V. L. Wildermuth, D. J. Caffrey, C. N. Ainslie.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Control of Diabrotica Balteata:**

*Object.*—To determine the extent to which this pest is liable to become diffused northward from Texas and to devise measures for restricting or eliminating its ravages.

*Location.*—Brownsville, Tex.

*Date begun.*—1912.

*Results.*—Field experiments have been continued, and it is probable that results will be published by the date for completion given.

*Probable date of completion.*—1915.

*Assignment.*—R. A. Vickery.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Native Species of White Grub:**

*Object.*—To destroy or prevent the appearance of white grub (*Lachnosterna*) larvæ in fields, either by the destruction of the larvæ themselves or by destroying the beetles before the eggs have been deposited; to determine the identity of parasites and the extent to which such natural enemies may be artificially utilized. In carrying on this work it will be necessary to determine the life cycle of the various species and adjust certain crops during years of abundance of the adults.

*Cooperation.*—State Entomologist of Illinois, Government Entomologist of the Dominion of Canada, and Indiana Agricultural Experiment Station.

*Location.*—Headquarters at La Fayette, Ind., and Urbana, Ill., with temporary stations at other points in territory infested by the different species throughout all the infested States.

*Date begun.*—1911.

*Results.*—Decided advance has been made in the direction of securing a practical knowledge of the habits of larvæ and adults of this species. Progress reflected in Farmers' Bulletin No. 543.

*Probable date of completion.*—About 1919.

*Assignment.*—J. J. Davis, C. N. Ainslie, E. O. G. Kelly, W. R. McConnell, and Henry Fox.

*Proposed expenditures, 1914-15.*—\$13,000 (general expenses).

**Wireworms:**

*Object.*—To determine the different species of wireworms attacking grain and forage crops, their habits and life history, most favorable conditions for development, and methods of control.

*Location.*—Tempe, Ariz.; Salt Lake City, Utah; Wellington, Kans.; La Fayette, Ind.; Elk Point, S. Dak.; Hagerstown, Md.; Charlottesville, Va.; Nashville, Tenn.; and Columbia, S. C.

*Date begun.*—1911.

**Wireworms—Continued.**

*Results.*—A vast amount of material and notes has accumulated, and in numerous cases the wireworm has been reared to the adult, thus completing for the first time the two forms of development. The actual progress made in the work is indicated in a general way by a Farmers' Bulletin now ready for publication.

*Assignment.*—J. A. Hyslop, C. N. Ainslie, W. R. McConnell, and Vernon King.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Jointworms:**

*Object.*—To establish the identity of each of the grain or grass infecting species and their relationship to each other; determine area of distribution of the at present supposed species; investigate methods of control, including studies of natural enemies.

*Cooperation.*—Indiana Agricultural Experiment Station.

*Location.*—La Fayette, Ind., and Charlottesville, Va., with temporary stations at other points, as the nature of the investigations may make necessary.

*Date begun.*—1911.

*Results.*—Considerable progress has been made in separating out the different forms and studying their relation to the grains and grasses which they inhabit. It seems probable that, while there are some new forms, a number of supposed forms will be found to be the same. Material is being received from trans-Atlantic countries with a view of determining whether some species have not been accidentally introduced.

*Probable date of completion.*—1916.

*Assignment.*—W. J. Phillips, Henry Fox, C. N. Ainslie, and C. W. Creel.

*Proposed expenditures, 1914-15.*—\$5,500 (general expenses).

**Sod Webworm:**

*Object.*—To study the life history, habits, and natural enemies of these moths and their larvæ in connection with the cultivation of cereals throughout the United States, the sod webworm being one of the most serious enemies of a grain crop following a grass crop.

*Cooperation.*—Indiana Agricultural Experiment Station; University of South Carolina.

*Location.*—Nashville, Tenn.; Columbia, S. C.; Charlottesville, Va.; Hagerstown, Md.; La Fayette, Ind.; Elk Point, S. Dak.; and Wellington, Kans.

*Date begun.*—1913.

*Results.*—Owing to lack of time and funds, but slight progress has been made in this investigation to date.

*Assignment.*—G. G. Ainslie, Philip Luginbill, and W. R. McConnell.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**Fall Army Worm:**

*Object.*—To investigate the life history, areas of perpetual habitation, and natural enemies, and to devise methods of control in the South through insecticidal and mechanical means and by the use of parasites, and prevent destructive invasions such as occurred during the year 1912.

*Location.*—Lakeland, Fla.; Brownsville, Tex.; Columbia, S. C.; Greenwood, Miss.; Wellington, Kans.; College Park, Md.; and elsewhere at such points as may from time to time become necessary.

*Date begun.*—1912.

*Results.*—Continued investigations at Brownsville, Tex., and at points in Florida and elsewhere during the winter months have proved that this species does not winter to any extent outside of Florida and extreme southern Texas, and that if it is controlled during the winter and early spring by its natural enemies no invasion to the northward during the season will follow.

*Probable date of completion.*—1917.

*Assignment.*—Philip Luginbill, W. R. McConnell, R. A. Vickery.

*Proposed expenditures, 1914-15.*—\$7,000 (general expenses).

**False Wireworms:**

*Object.*—To study the life history and habits of false wireworms affecting growing grain, and devise methods for their control.

*Location.*—Wellington, Kans.; Elk Point, S. Dak.; Salt Lake City, Utah; Tempe, Ariz.

*Date begun.*—1911

**False Wireworms—Continued.**

*Results.*—Other species of similar habits damaging wheat and other grain crops in Kansas, New Mexico, and elsewhere in the Southwestern States, are being investigated, and the results in some cases will be ready for publication during the fiscal year 1914-15.

*Assignment.*—E. O. G. Kelly.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Miscellaneous Cereal Insects:**

*Object.*—To investigate sporadic or periodic outbreaks of insects that may attack cereals and such others, not included in the foregoing, whose sudden appearance in unusual abundance may require immediate investigation; also to investigate such species as may not have heretofore been known as destructive.

*Location.*—Dependent on the exigencies of the work.

*Date begun.*—1910.

*Assignment.*—F. M. Webster and field assistants.

*Proposed expenditures, 1914-15.*—\$2,700 (general expenses).

**Total, Cereal Insect Investigations,** \$62,700 (general expenses).

**FORAGE INSECT INVESTIGATIONS.****Alfalfa Seed Chalcis:****(a) LIFE-HISTORY STUDIES AND METHODS OF CONTROL—**

*Object.*—To study the life history of the insect and determine some practical method of preventing the large percentage of loss of clover and alfalfa seed due to chalcis.

*Location.*—Glendale, Cal.; Tempe, Ariz.; Salt Lake City, Utah; Elk Point, S. Dak.; Wellington, Kans.

*Date begun.*—1912.

*Results.*—A large number of life-history studies and cultural experiments have been carried out looking toward a control of the pest; but also a number of complications have been discovered which render the progress in this direction somewhat slow.

*Probable date of completion.*—1915.

*Assignment.*—T. D. Urbahns, V. L. Wildermuth, R. N. Wilson, L. P. Rockwood, C. W. Creel.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**(b) STUDY OF PARASITIC ENEMIES—**

*Object.*—To conduct life-history studies of native parasites of the alfalfa and clover seed chalcis with a view of controlling the pest.

*Location.*—Glendale, Cal.; Tempe, Ariz.; Salt Lake City, Utah; Elk Point, S. Dak.; Wellington, Kans.

*Date begun.*—1913.

*Results.*—A large number of parasites have been carefully reared and studied with relation to their host insect, most of them being new to science.

*Probable date of completion.*—1915.

*Assignment.*—T. D. Urbahns, V. L. Wildermuth, P. H. Timberlake, A. B. Gahan, C. W. Creel.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Insects Affecting the Production of Clover Seed:**

*Object.*—To carry on life-history studies of the clover-seed chalcis, which affects both clover and alfalfa, and investigate various other insects affecting clover seed, including a study of insect fertilization of the bloom.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Forest Grove, Oreg.; Salt Lake City, Utah; Elk Point, S. Dak.; La Fayette, Ind.; Nashville, Tenn.; Charlottesville, Va.; Hagerstown, Md.

*Date begun.*—1911.

*Results.*—Studies of the chalcis have revealed a considerable variation in habit as between the arid West and the more humid regions of eastern United States and on the Pacific coast. A large number of parasites have been reared, most of them proving to be new to science. Similar results have been obtained with the clover-flower midge and its climatic variations.

*Assignment.*—C. W. Creel, A. B. Gahan.

*Proposed expenditures, 1914-15.*—\$5 300 (general expenses).

**Insects Affecting Soy Beans:**

*Object.*—To become entirely familiar with the life history and habits of insects affecting this crop, which is constantly increasing in importance.

*Cooperation.*—Indiana Agricultural Experiment Station.

*Location.*—La Fayette, Ind.; Charlottesville, Va.; Nashville, Tenn.; Columbia, S. C.; Greenwood, Miss.; Wellington, Kans.

*Date begun.*—In a limited way in 1912.

*Results.*—A considerable number of insects have been reared from soy beans, thus beginning to give an idea of what pests the farmer may expect to encounter in the growth of this forage plant.

*Assignment.*—W. J. Phillips, Philip Luginbill, E. H. Gibson, W. R. McConnell.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Range Caterpillar:**

*Object.*—To determine methods of eradicating the insect during its different stages of development, in the most practical and inexpensive manner, including experiments with parasites and predaceous insects as well as other natural enemies, and with such mechanical devices as may be found of practical use.

*Location.*—Raton, N. Mex., and throughout the country included in northeastern New Mexico, the panhandle section of Texas, the Cherokee strip of Oklahoma, southwestern Kansas, and southeastern Colorado.

*Date begun.*—1908, but work suspended until 1913 owing to lack of funds.

*Results.*—Mechanical measures tried with indifferent success, owing to topography and inaccessibility of the country. In the investigation of natural enemies, the skunk has been found to destroy vast numbers; two parasites, primarily introduced into this country from Europe in the gipsy-moth work, are being colonized and show encouraging tendency in destroying caterpillars. Native insects from other States known to be predaceous are found by experimentation to feed freely on the caterpillars and to be easily colonized within the area infested by this pest.

*Probable date of completion.*—1916.

*Assignment.*—V. L. Wildermuth, D. J. Caffrey, F. H. Gates, W. R. Walton.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses).

**Alfalfa Weevil:****(a) STUDY OF PARASITIC ENEMIES—**

*Object.*—To introduce from Europe, Asia, and Africa and to colonize and study the habits and life history of insect and fungous enemies of the alfalfa weevil; also to investigate native natural enemies of this pest.

*Location.*—Salt Lake City, Utah, and other points throughout area of distribution of weevil.

*Date begun.*—1910.

*Results.*—In introduction of foreign natural enemies, where one of these from Europe was liberated, 25 per cent of the larvæ are now parasitized. Other foreign parasites have been introduced without definite knowledge relative to success with them.

*Assignment.*—P. H. Timberlake, L. P. Rockwood.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses).

**(b) PRACTICAL ARTIFICIAL METHODS OF CONTROL—**

*Object.*—To determine the efficiency of cultivation and irrigation (if in an irrigated country), either combined or independently, as a practical means of weevil control; use of various contrivances or methods for destroying the weevils; and to devise inexpensive and practical methods of eradication.

*Cooperation.*—Bureau of Plant Industry, Biological Survey, and Utah Agricultural Experiment Station.

*Location.*—Throughout Utah, Nevada, California, Arizona, New Mexico, Colorado, Wyoming, Idaho, Oregon, and Montana wherever the most favorable conditions can be found.

*Date begun.*—1912.

*Results.*—Substantial progress made in affording farmers practical methods of control, many farmers agreeing that they can now raise better crops of alfalfa than heretofore.

*Assignment.*—Geo. I. Reeves, L. P. Rockwood, Philip B. Miles.

*Proposed expenditures, 1914-15.*—\$4,000 (general expenses).

**Alfalfa Weevil—Continued.****(c) DISPERSION OF THE ALFALFA WEEVIL—**

*Object.*—To determine extent of increase in territory covered by the weevil during the fiscal year 1913-14.

*Cooperation.*—Entomologists in the States given under heading "Location."

*Location.*—Utah, Nevada, California, Arizona, New Mexico, Colorado, Wyoming, Idaho, Oregon, and Montana.

*Date begun.*—1912.

*Results.*—No information has been obtained going to show diffusion by passenger or Pullman coaches or open freight cars; though the insect is carried long distances in refrigerator cars, reaching its destination alive, no new introductions have actually been traced to this cause.

*Assignment.*—Geo. I. Reeves, P. B. Miles, T. R. Chamberlin.

*Proposed expenditures, 1914-15.*—\$4,000 (general expenses).

**Insects Affecting Cowpeas:**

*Object.*—To collect information relative to all insects attacking cowpeas, either above or below ground, to determine the influence on the fertilizing value of the plants from attacks of larvæ on the nitrogenous nodules of the roots.

*Cooperation.*—Bureau of Plant Industry furnishes seed.

*Location.*—Charlottesville, Va.; Nashville, Tenn.; Columbia, S. C.; Greenwood, Miss.; Brownsville, Tex.; Wellington, Kans.; Tempe, Ariz.

*Date begun.*—1912.

*Results.*—It has been found that the most destructive stage is that of the larvæ, which destroy the nitrogenous nodules on the roots.

*Assignment.*—W. J. Phillips, Philip Luginbill, E. H. Gibson.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Miscellaneous Forage Insects:**

*Object.*—To investigate outbreaks of miscellaneous insects as occasion may require.

*Location.*—At the various field stations throughout the United States as conditions demand.

*Date begun.*—1910.

*Assignment.*—F. M. Webster, and field assistants.

*Proposed expenditures, 1914-15.*—\$2,800 (general expenses).

**Total, Forage Insect Investigations,** \$47,100 (general expenses).

**Total, Cereal and Forage Insect Investigations,** \$117,500 (general expenses, \$114,500; statutory, \$3,000).

**SOUTHERN FIELD-CROP INSECT INVESTIGATIONS.****SUPERVISION.****Supervision:**

*Object.*—To supervise the research activities and carry on administrative and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—W. D. Hunter.

*Proposed expenditures, 1914-15.*—\$6,100 (general expenses, \$4,500; statutory, \$1,600).

**COTTON INSECT INVESTIGATIONS.****Cotton Boll Weevil:****(a) CONTROL IN SEVERELY INJURED SECTIONS—**

*Object.*—To relieve the present situation in the Mississippi Valley, where cultural methods of controlling the boll weevil have been of comparatively little value, and also furnish relief in other sections where the damage is very severe. Experiments in methods of cultivation, hand picking of squares, parasite release, rotations, and all other means of promise are to be conducted until the proper means of control in these sections can be perfected.

*Cooperation.*—State experiment stations in Louisiana and Mississippi.

*Location.*—Tallulah, La., Opelousas, La., Port Gibson, Miss.

*Date begun.*—1895, in Texas; 1904, in Louisiana; 1910, in Mississippi.

*Results.*—In western Louisiana the control of the boll weevil has brought acreage yields almost back to normal. In the Delta the work of the last three years has given greater confidence to the planters, who have been enabled to greatly reduce their losses.

*Assignment.*—G. D. Smith.

*Proposed expenditures, 1914-15.*—\$8,850 (general expenses).

**Cotton Boll Weevil—Continued.****(b) LIFE-HISTORY STUDIES—**

*Object.*—To determine the extent to which the weevil has changed its habits during the period it has existed in the country, and to study it under native conditions. In connection with the Arizona cotton industry, studies of the adaptability of the weevil to the greater severities of Arizona climate and comparison with Texas and Louisiana results will be made, with the view to working out climatic laws of behavior.

*Cooperation.*—State experiment stations in Arizona.

*Location.*—Tucson, Ariz.; Victoria, Tex.; Tallulah, La.

*Date begun.*—1904.

*Results.*—The studies of 1913 in Texas indicated an ability to live on other food plants and withstand greater severities of climate. Preliminary work in Arizona proved adaptability under native conditions.

*Assignment.*—W. D. Pierce, B. R. Coad, G. D. Smith.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**(c) STATUS AND DISPERSION OF BOLL WEEVIL—**

*Object.*—To determine the prospects for damage early in the season; to investigate reports of serious damage and new infestation; to determine extent of spread and actual losses during season; to map area of infestation, distribute warnings of future damage, and maintain quarantine.

*Cooperation.*—State entomologists of Arizona, Texas, Louisiana, Oklahoma, Arkansas, Mississippi, Alabama, Florida, and Georgia.

*Location.*—All sections of cotton belt where weevil occurs or is reported to occur.

*Date begun.*—1892.

*Results.*—By means of the information secured through this service a quarantine against artificial distribution has been maintained which efficiently prevented unnatural spread. The statements issued have been instrumental in determining the course of action of many planters and business men.

*Assignment.*—W. D. Pierce.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Cotton Root Aphides:**

*Object.*—To determine means of control.

*Cooperation.*—South Carolina Agricultural College.

*Location.*—Clemson College, Marion, and Waterloo, S. C.

*Date begun.*—1910.

*Results.*—Publication of preliminary results through South Carolina Experiment Station. Relief indicated through rotation.

*Assignment.*—A. F. Conradi.

*Proposed expenditures, 1914-15.*—\$450 (general expenses).

**Cotton Red Spider:**

*Object.*—To determine practical means of reducing losses to cotton planters caused by the red spider, and to conduct practical demonstrations.

*Location.*—Batesburg, S. C.; general observations in other infested sections of the cotton belt.

*Date begun.*—1910.

*Results.*—Preliminary results have been published by the bureau; exact efficiency of several methods determined and demonstrated on a small scale.

*Assignment.*—E. A. McGregor.

*Proposed expenditures, 1914-15.*—\$4,300 (general expenses).

**Cotton Insect Injury in Imperial Valley, Cal.:**

*Object.*—To determine the extent of injury by the thrips and other insects affecting cotton in the Imperial Valley, and to perfect methods of control.

*Cooperation.*—Bureau of Plant Industry; Horticultural Commissioners of Imperial County, Cal.

*Location.*—Calexico and El Centro, Cal.

*Date begun.*—1913.

*Results.*—A preliminary list of cotton insects has been prepared. |||

*Assignment.*—W. D. Pierce.

*Proposed expenditures, 1914-15.*—\$2,300 (general expenses).

**Miscellaneous Insects Affecting Cotton:**

*Object.*—To determine the extent of the well-known shedding of cotton fruit, which may be due to insects that feed upon the blooms; to study relation of cutworms and aphides to abortive condition of plants; to determine means of reducing damage to the squares by cotton flea and other piercing bugs.

**Miscellaneous Insects Affecting Cotton—Continued.**

*Location.*—Victoria, Tex.; Calxico and El Centro, Cal.; Tucson, Ariz.; Tallulah, La.; Batesburg, S. C.

*Date begun.*—1913.

*Results.*—Only preliminary notes on insects causing shedding have so far been gathered, but these indicate great losses.

*Assignment.*—W. D. Pierce.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**Total, Cotton Insect Investigations, \$27,900 (general expenses).**

**TOBACCO INSECT INVESTIGATIONS.****Tobacco Hornworms:**

*Object.*—To demonstrate to planters control measures to reduce losses, especially by the use of powdered arsenate of lead.

*Cooperation.*—Tennessee Agricultural Experiment Station.

*Location.*—Clarksville, Tenn.; points in Kentucky and Tennessee.

*Date begun.*—1912.

*Results.*—The practical value of arsenate of lead used in a powdered form has been determined and published.

*Assignment.*—A. C. Morgan.

*Proposed expenditures, 1914-15.*—\$10,000.

**Cigarette Beetle:**

*Object.*—To determine feasible means of preventing losses in warehouses and factories.

*Location.*—Richmond, Va.; Tampa and Key West, Fla.; Clarksville, Tenn.

*Date begun.*—1910.

*Results.*—In a preliminary way the value of artificial cold has been determined; inefficiency of certain other means shown.

*Assignment.*—A. C. Morgan.

*Proposed expenditures, 1914-15.*—\$2,650.

**Insect Transmission of Mosaic Disease:**

*Object.*—To determine what insects are capable of transmitting the disease under different conditions.

*Cooperation.*—Bureau of Plant Industry; Tennessee Experiment Station.

*Location.*—Clarksville, Tenn.

*Date begun.*—1913.

*Results.*—It has been determined that the tobacco flea beetle and hornworms may, under certain conditions, be transmitters.

*Assignment.*—A. C. Morgan.

*Proposed expenditures, 1914-15.*—\$1,850.

**Miscellaneous Tobacco Insects:**

*Object.*—To determine the possibility of preventing serious losses from miscellaneous tobacco insects, including bud worms, wireworms, and the large tobacco beetle, by the use of poisons and other methods.

*Cooperation.*—Florida and Virginia experiment stations.

*Location.*—Quincy and Key West, Fla.; Appomattox, Va.

*Date begun.*—1910.

*Results.*—The control of the wireworm has been worked out and published upon.

*Assignment.*—A. C. Morgan.

*Proposed expenditures, 1914-15.*—\$3,500.

**Total, Tobacco Insect Investigations, \$18,000 (general expenses, \$17,000; statutory, \$1,000).**

**RICE INSECT INVESTIGATIONS.****Rice Water Weevil and Other Rice Insects:**

*Object.*—To investigate the means of control of rice insect pests.

*Cooperation.*—Louisiana Experiment Station.

*Location.*—Crowley, La.; points in Texas and Arkansas.

*Date begun.*—1912.

*Results.*—The control of the rice weevil by manipulation of water has been worked out at Crowley, La.

*Assignment.*—J. L. Webb.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

## SUGAR-CANE INSECT INVESTIGATIONS.

**Sugar-Cane Moth Borer:**

*Object.*—To discover means of controlling the moth borer in sugar cane and corn, especially in adapting cultural practices to the increase of parasites.

*Cooperation.*—Louisiana Experiment Station.

*Location.*—New Orleans, La.

*Date begun.*—1910.

*Results.*—Preliminary results in control indicate the fallacy of burning trash, as this destroys the parasites.

*Assignment.*—T. E. Holloway.

*Proposed expenditures, 1914-15.*—\$2,400 (general expenses).

**Miscellaneous Insects Affecting Sugar Cane:**

*Object.*—To determine the damage done to sugar cane by miscellaneous insects, including mealy bugs and root borers, and to perfect means of control.

*Cooperation.*—Louisiana Experiment Station.

*Location.*—New Orleans, La.

*Date begun.*—1911.

*Results.*—Information has been obtained as to the means of spread, thus assisting the control of the species.

*Assignment.*—U. C. Loftin.

*Proposed expenditures, 1914-15.*—\$1,700 (general expenses).

**Total, Sugar-Cane Insect Investigations, \$4,100 (general expenses).**

## ARGENTINE ANT INVESTIGATIONS.

**Argentine Ant Investigations:**

*Object.*—To reduce losses occurring in cane plantations and orchards, and annoyance in warehouses, residences, and elsewhere, due to the Argentine ant.

*Cooperation.*—Louisiana Experiment Station.

*Location.*—New Orleans, La.; Hattiesburg, Miss.

*Date begun.*—1910.

*Results.*—The infestation at Hattiesburg, Miss., was greatly reduced by the distribution of poison bait.

*Assignment.*—E. R. Barber.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Total, Southern Field-Crop Insect Investigations, \$61,600 (general expenses, \$59,000; statutory, \$2,600).**

## FOREST INSECT INVESTIGATIONS.

## SUPERVISION.

**Supervision:**

*Object.*—To supervise the field and laboratory investigations and conduct the necessary administrative and office work incident thereto.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Assignment.*—A. D. Hopkins.

*Proposed expenditures, 1914-15.*—\$4,700 (general expenses, \$3,500; statutory, \$1,200).

## FIELD INVESTIGATIONS.

**Forest-Reproduction Insects:**

*Object.*—To determine the character and cause of injuries to the flowers, fruit, and seed on the trees, and the seeds stored in the ground; of injuries to the young seedlings, roots, stems, and foliage; of injuries to saplings, roots, stems, branches, and foliage; and determine methods of prevention and control.

*Location.*—United States.

*Date begun.*—1904.

*Results.*—The general information acquired on this subject renders it possible to give prompt and reliable information on specific questions. It has been found that certain wood borers attacking sapling hardwood trees cause an enormous loss in the form of defects in the wood of matured trees. Proper selective thinning is the remedy advised.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Insect Damage to Forest-Tree Seeds:**

*Object.*—To determine the character and extent of damage by insects to the seeds of coniferous trees of the western United States; and to carry on a systematic and economic study of the insects involved and methods of control.

*Location.*—Rocky Mountain and Pacific slope.

*Date begun.*—1913.

*Results.*—A very large percentage of the seed crop of western coniferous trees is destroyed by seed-infesting insects. Losses by collectors and planters through the handling of defective seed can be avoided through the information which can now be furnished.

*Assignment.*—J. M. Miller, assisted in the collection of material by other members of the field force in the area mentioned and by the laboratory force in identification of species.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Damage to Reproduction Conifers by Lepidopterous Insects and Pissodes Beetles:**

*Object.*—To determine the character and extent of damage to pine and other conifers by the tip moth, pitch worms, and other insects, and to conduct a systematic and economic study of the insects and methods of preventing losses.

*Location.*—Northern Rocky Mountain States.

*Date begun.*—1913.

*Results.*—The damage to reproduction pine caused by small caterpillars mining in the tips of new growth is very serious in some localities, and evidence has been secured that much of this loss can be prevented by proper management of nurseries and plantations.

*Assignment.*—Josef Brunner.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Relation of Climatic Conditions to Forest Insect Life:**

*Object.*—To determine the influence of (a) wet and dry seasons and warm and cold winters, (b) windstorms, (c) injuries by lightning, (d) dry and wet soils and other physical conditions, and (e) latitude and altitude on the periodical phenomena of insects.

*Location.*—United States.

*Date begun.*—1905.

*Results.*—Droughts are not favorable or unfavorable to tree-killing insects. Excessively cold winters will kill some insects. Windstorms often favor insect depredations. The information acquired on these subjects is of special value in the recommendations of methods of control and prevention of insect depredations.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Relation of Latitude and Altitude to the Periodical Phenomena of Insects, Especially Forest Insects:**

*Object.*—To determine by means of phenological data on plants and animals, the normal rate of difference in the beginning and ending of periodical phenomena of insects due to differences in latitude and altitude and local physical conditions.

*Location.*—United States.

*Date begun.*—1897.

*Results.*—It has been determined that for animals and plants there is a rate of difference in the periodical events in their life, reproduction, and growth of about 4 days for each degree of latitude, 4 days for each 400 feet of altitude, and 4 days for each 5 degrees of longitude. Studies in the practical application of this law have shown it to be of great importance in planning and conducting control work against forest insects.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$2,250 (general expenses).

**Relation of Injuries by Lightning to Subsequent Injuries by Insects:**

*Object.*—To determine the relation of injuries by lightning to (a) the direct cause of the death of trees; (b) subsequent attack by *Dendroctonus* beetles as a cause of death; (c) attack by other insects as the final cause of death; (d) the starting of destructive outbreaks of *Dendroctonus* beetles; (e) the starting of fires from lightning striking old insect-killed trees; (f) the attraction of destructive insects to near-by healthy trees.

*Location.*—United States.

*Date begun.*—1905.

**Relation of Injuries by Lightning to Subsequent Injuries by Insects—Con.**

*Results.*—It has been found that lightning rarely kills a tree unless it shatters it, but that the death of lightning-struck trees is often caused by insects and that, in some cases, outbreaks of a destructive insect are thus started.

*Assignment.*—W. D. Edmonston.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Interrelation of Insects and Forest Fires in the Destruction of Forests:**

*Object.*—To determine the relation of injuries by insects to subsequent injuries or destruction by forest fires, and the relation of injuries by forest fires to subsequent injuries by insects.

*Location.*—Rocky Mountain and Pacific Slope States.

*Date begun.*—1899.

*Results.*—It has been determined that insects are the primary cause of the death of more merchantable-sized timber than that caused by forest fires, and that the timber killed by insects contributes to the starting and spread of destructive fires. Therefore, the control of the destructive insects will contribute to the control of forest fires.

*Assignment.*—Josef Brunner.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses).

**Insect Damage to the Wood of Fire-Killed Timber:**

*Object.*—To determine the character and extent of damage by wood-boring insects to fire-killed timber, and a systematic and economic study of the insects involved.

*Location.*—United States.

*Date begun.*—1905.

*Results.*—It has been determined that a large percentage of the losses from this class of depredations can be prevented.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Insects Injurious to Forest Products:**

*Object.*—To determine the character, cause, and extent of injuries to crude, finished, and utilized forest products, and methods of preventing losses.

*Cooperation.*—Informal cooperation with manufacturers and utilizers of forest products.

*Location.*—United States.

*Date begun.*—1903.

*Results.*—The results of extensive experiments with wood preservatives and different kinds of wood have shown that a large percentage of the serious losses heretofore suffered can be prevented, and the methods recommended are being put into practice.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Bark Weevils of the Genus *Pissodes* of North America:**

*Object.*—To determine the number of species of bark weevils, their distribution, kinds of trees infested, character and extent of injuries by each, life histories, natural enemies, and methods of preventing losses; also to describe new species.

*Location.*—United States.

*Date begun.*—1903.

*Results.*—It has been found that this class of bark borers is among the most destructive enemies of reproduction in pine and spruce, and methods of practical control of some of them have been determined.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$200 (general expenses).

**Hickory Insects:**

*Object.*—A thorough study of the insects of different species of hickory, to determine the cause of extensive dying of hickory and methods of controlling the primary enemies and preventing losses of the crude and stored commercial products of wood and nuts.

*Location.*—Eastern United States.

*Date begun.*—1902.

*Results.*—The seasonal history of the hickory bark beetle has been completed and, as a result of information disseminated through publications and correspondence, this most destructive enemy of the hickory trees of the eastern United States is being brought under control.

*Assignment.*—A. D. Hopkins and field assistants.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Ash Insects:**

*Object.*—A thorough study of the insects of different species of ash, to determine the cause of injuries to the tree and its products; to determine methods of controlling the primary enemies and preventing losses of the crude and stored commercial products.

*Location.*—United States.

*Date begun.*—1904.

*Results.*—It has been determined that the damage to crude and finished ash products caused by wood-boring insects is very extensive and that much of this loss can be prevented.

*Assignment.*—All members of the field force, assisted in identification of material and compilation of data by the laboratory force.

*Proposed expenditures, 1914-15.*—\$2,200 (general expenses).

**Economic Investigation of the Scolytid Bark and Timber Beetles of North America:**

*Object.*—To determine the character and extent of damage done by these insects to forest growth and forest products, seasonal history and habits of the principal species, and practical methods of preventing losses from their work.

*Location.*—United States.

*Date begun.*—1890.

*Results.*—The results of investigations of methods of controlling depredations by bark beetles in the coniferous forests of North America have made it possible to discover and recommend practical methods of protecting national, State, and private forests from their most destructive insect enemies. The value of this result alone is not less than \$10,000,000 annually in the value of timber that can be saved at little or no first cost.

*Assignment.*—A. D. Hopkins, assisted in the collection of material by the field force.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Economic Study of Forest Buprestidæ, or Flat-Headed Borers:**

*Object.*—Same as under preceding project, "Economic Investigation of the Scolytid Bark and Timber Beetles of North America."

*Location.*—United States.

*Date begun.*—1904.

*Results.*—It has been shown that some of the flat-headed borers are destructive to living timber, while others are destructive to the wood of living and dead timber, and progress is being made in the determination of methods of prevention and control.

*Assignment.*—H. E. Burke.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Economic Study of Forest Cerambycidæ, or Round-Headed Borers:**

*Object.*—Same as stated in preceding project.

*Location.*—United States.

*Date begun.*—1904.

*Results.*—The results of special study of this class of bark and wood borers have shown that they are far more destructive than was heretofore supposed. Special progress has been made in seasonal history studies which suggest practical methods of preventing losses.

*Assignment.*—F. C. Craighead.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Economic Study of Beneficial Forest Insects:**

*Object.*—To determine the character and extent of beneficial influences of parasitic and predatory insects, their seasonal history and natural enemies, methods of propagating and encouraging their beneficial work, importation of foreign species, and artificial dissemination of native species.

*Location.*—United States.

*Date begun.*—1903.

*Results.*—Many new facts have been determined regarding the principal parasitic and predaceous insects which are the natural enemies of injurious insects, and this information has been of special importance in connection with the practical application of artificial methods of control.

*Assignment.*—A. B. Champlain.

*Proposed expenditures, 1914-15.*—\$1,870 (general expenses).

## Systematic and Economic Investigations of the Bark Lice of the Genus *Chermes*:

*Object*.—The determination of systematic and bionomic facts relating to the species of *Chermes* which infest the bark of coniferous and other forest trees, with special reference to the one or more species at present recognized as *Chermes pinicorticis* Fitch, and to determine the character and extent of injury resulting from its presence on the living bark of young to matured white pine (*Pinus strobus*).

*Location*.—United States.

*Date begun*.—1908.

*Results*.—It has been found that this class of insects, each species of which lives alternately on two different species of trees, making galls on the twigs of spruce and infesting the twigs and bark of pine, is of special economic importance. It has been discovered that if nursery and ornamental trees are sprayed with kerosene emulsion at the time new growth starts on the twigs it will protect the trees from damage by this class of insects.

*Assignment*.—All members of the field force assist in identification of material and compilation of data by the laboratory force.

*Proposed expenditures, 1914-15*.—\$500 (general expenses).

## Powder-Post Injury to Seasoned Forest Products:

*Object*.—To determine (a) character and extent of damage to seasoned, crude, and finished products by powder-post insects; (b) seasonal history and habits of the insects; and (c) practical methods of control, including experiments with woods treated with chemical preservatives, etc.

*Cooperation*.—Informal cooperation with manufacturers and utilizers of forest products.

*Location*.—United States.

*Date begun*.—1902.

*Results*.—The results of investigation have made it possible to recommend practical methods of preventing losses from this class of insects, which heretofore caused enormous losses of seasoned rough and finished forest products. The Army and Navy have adopted our recommendations for their storehouses, and leading manufacturers all over this country and in other countries are profiting by the information disseminated.

*Assignment*.—T. E. Snyder.

*Proposed expenditures, 1914-15*.—\$500 (general expenses).

## Damage to Poles, Posts, Mine Props, Railroad Ties, and Similar Forest Products by Wood-Boring Insects:

*Object*.—To determine character and extent of the damage, principal insects involved, their seasonal histories, and practical methods of prevention and control, including experiments with wood preservatives as a means of preventing damage.

*Cooperation*.—Informal cooperation with manufacturers and utilizers of forest products.

*Location*.—United States.

*Date begun*.—1910.

*Results*.—Wood-boring insects cause very serious damage to poles set in the ground and in mines. As a result of detailed study and experiments, railroad, telephone, telegraph, and mining industries are adopting and putting into practice the methods recommended, with most gratifying results.

*Assignment*.—T. E. Snyder.

*Proposed expenditures, 1914-15*.—\$250 (general expenses).

## *Agrilus* Beetles:

### (a) RELATION TO THE DEATH OF FOREST TREES—

*Object*.—To investigate the relation of *Agrilus* beetles to (a) the direct death of trees; (b) trees injured by disease; (c) trees defoliated by insects; (d) trees the roots of which have been injured by insects or other agencies; (e) trees struck by lightning or injured from other causes; and (f) stumps of trees felled during the winter.

*Location*.—United States.

*Date begun*.—1913.

*Results*.—These beetles are very destructive to many kinds of trees, and as secondary enemies to trees weakened by other insects or disease are often more important than the primary enemy, and as a rule they may be more readily controlled.

*Assignment*.—A. D. Hopkins and field assistants.

**Agrilus Beetles—Continued.****(b) SEASONAL HISTORY AND HABITS OF AGRILUS BEETLES—**

*Object.*—To determine the seasonal history and habits of the beetle, general and local.

*Location.*—United States.

*Date begun.*—1913.

*Results.*—The seasonal history of some of the more important species has been worked out and important new facts determined in regard to their habits.

*Assignment.*—A. D. Hopkins and field assistants.

**(c) NATURAL ENEMIES OF THE BEETLES—**

*Object.*—To determine the natural enemies of different stages of Agrilus beetles and the relation of such enemies to natural control.

*Location.*—United States.

*Date begun.*—1913.

*Results.*—Many new undescribed species of insect enemies have been discovered and their habits studied.

*Assignment.*—A. D. Hopkins and field assistants.

**(d) PRACTICAL METHODS OF CONTROL AND PREVENTION OF THE BEETLES—**

*Object.*—Investigations and experiments to determine practical methods of control and prevention of depredations by the various species of Agrilus on forest-tree growth.

*Location.*—United States.

*Date begun.*—1913.

*Results.*—With a knowledge of the natural enemies of the beetles, artificial measures can be employed in such a manner as to get the best results with the least cost.

*Assignment.*—A. D. Hopkins and field assistants.

**Total, Investigations of Agrilus Beetles, \$5,000 (general expenses).**

**Relation of Mistletoe on Living Trees to Attack by Insects:**

*Object.*—To determine (a) whether trees infested by mistletoe or witches'-broom are more subject to attack by bark-boring insects than trees not so affected; (b) whether trees weakened by mistletoe contribute to the increase of tree-killing insects; (c) relation of the subject to the general problem of insect control.

*Location.*—Rocky Mountain and Pacific Slope States.

*Date begun.*—1913.

*Results.*—Heretofore it has been thought that trees infested by mistletoe were more subject to attack by tree-killing insects than trees not so infested. Investigations so far indicate that this is not the case.

*Assignment.*—H. E. Burke.

*Proposed expenditures, 1914-15.*—\$250 (general expenses).

**Total, Field Investigations, \$35,020 (general expenses).**

**LABORATORY INVESTIGATIONS.****Forest and Other Scolytidæ:**

*Object.*—To (a) determine, classify, and describe the genera, species, and stages of development which are new to science; (b) revise and bring up to date the systematic knowledge of all North American species; (c) investigate problems relating to anatomy, taxonomy, terminology, and nomenclature; (d) determine seasonal histories, food and breeding habits, geographical distribution, and such other information of a technical nature about the species as is essential to the best success in the investigation and practical treatment of economic problems.

*Location.*—Washington, D. C.

*Date begun.*—1902.

*Results.*—The results of the systematic work on this group of insects have shown that nothing whatever has been known of a large number of the most destructive insect enemies of North American forest trees. The information acquired has made it possible to study their exact economic relations to the trees and to discover practical methods of control and prevention. The value of the result of this work alone may be estimated in the tens of millions of dollars toward the practical conservation of the forest resources of the United States. The collections are the largest in the world, and specimens are sent here from many other countries for authentic identification.

*Assignment.*—A. D. Hopkins, assisted by the field and laboratory force in the collection of material and compilation of data.

*Proposed expenditures, 1914-15.*—\$2,530.

**Forest and Other Buprestid Larvæ:**

*Object.*—Same as stated under preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—Heretofore practically nothing was known of the systematic characters by which the larvæ of various species of this class of insects could be identified, and without this knowledge very little could be accomplished in the study of seasonal history and habits, and practically nothing could be done toward the discovery of effective methods of control. Special progress has been made in this work in the discovery of new facts of economic importance.

*Assignment.*—H. E. Burke.

*Proposed expenditures, 1914-15.*—\$1,500.

**Forest and Other Cerambycid Larvæ:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—Exceptional progress has been made in the investigation of these larvæ. While they are of great economic importance, very little was known about them a few years ago. Now more than 250 species have been identified and a fund of information acquired of great scientific and economic value.

*Assignment.*—F. C. Craighead.

*Proposed expenditures, 1914-15.*—\$1,500.

**Forest Hymenoptera:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—The results of systematic work on this group of insects, which includes both injurious and beneficial species, are of special scientific and economic importance. Without the knowledge gained from such a study it would be impossible to arrive at definite conclusions as to the relation of the beneficial insects to natural control or to profit by their beneficial influences in connection with the practice of artificial methods of combating insects.

*Assignment.*—S. A. Rohwer.

*Proposed expenditures, 1914-15.*—\$2,000.

**Forest Lepidoptera:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Until recent years, this important group of forest insects has been almost neglected in this country, but now that a specialist is working on it rapid progress is being made and information being acquired which is of fundamental importance to the field investigations of economic problems. Large additions have been made to the collection.

*Assignment.*—August Busck.

*Proposed expenditures, 1914-15.*—\$2,500.

**Forest Coleoptera:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—This group of insects is represented by more species of economic importance than any other and therefore requires special study and the proper arrangement and care of the collections, in which gratifying progress has been made.

*Assignment.*—W. S. Fisher.

*Proposed expenditures, 1914-15.*—\$2,500.

**Forest Diptera:**

*Object.*—Same as preceding project.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Very little has been known of this group of insects in their relation to forest growth in America; hence the necessity of systematic work as a basis for economic investigations. Some important discoveries have been made during the past two years and large additions have been made to the collection.

*Assignment.*—C. T. Greene.

*Proposed expenditures, 1914-15.*—2,500.

**Forest and Other Isoptera:***Object.*—Same as preceding project.*Location.*—Washington, D. C.*Date begun.*—1912.*Results.*—The results of work on the white ants of North America have shown that they are of special economic importance, causing as they do great damage to buildings, poles, posts, construction timbers, etc. It has been found that there is special need for detailed systematic study of the species as a basis for effective economic work.*Assignment.*—T. E. Snyder.*Proposed expenditures, 1914-15.*—\$1,500.**Forest and Other Coleopterous Larvæ:***Object.*—Same as preceding project.*Location.*—Washington, D. C.*Date begun.*—1913.*Results.*—Practically nothing has been known of the immature stages of even the common beetles which infest the forest trees of this country and their products. Systematic work on this subject has just been started, but the results so far attained show the absolute necessity of it as a basis for economic investigations.*Assignment.*—Adam Boving.*Proposed expenditures, 1914-15.*—\$2,500.**Total, Laboratory Investigations,** \$19,030 (general expenses, \$16,270; statutory, \$2,760).**Total, Forest Insect Investigations,** \$58,750 (general expenses, \$54,790; statutory, \$3,960).**INVESTIGATIONS OF THE MEDITERRANEAN FRUIT FLY.****Administration:***Object.*—General administration of the investigational and clerical work, inspections, and regulations.*Location.*—Washington, D. C.; field office, Honolulu, Hawaii.*Date begun.*—1912.*Assignment.*—C. L. Marlatt.*Proposed expenditures, 1914-15.*—\$6,800 (general expenses, \$5,000; statutory, \$1,800).**Life-History Studies:***Object.*—Study of life history of the fruit fly in relation to its hosts, looking to means of control and cooperation in the introduction of parasites from foreign countries.*Cooperation.*—Hawaiian Territorial Board of Agriculture.*Location.*—Honolulu, Hawaii.*Date begun.*—1912.*Results.*—Life-history studies well advanced; preliminary report ready for publication.*Probable date of completion.*—Life history and host relations, 1915; preventive and control work, indefinite.*Assignment.*—E. A. Back.*Proposed expenditures, 1914-15.*—\$15,000 (general expenses).**Control of Export Hawaiian Fruit:***Object.*—Inspection and certification of pineapples and bananas for export from Hawaii to mainland of the United States under Quarantine No. 13, and general enforcement of this quarantine.*Cooperation.*—Hawaiian Territorial Board of Agriculture, State inspectors, United States Postal Service, and Customs Service.*Location.*—Honolulu, Hawaii; San Francisco and other Pacific ports.*Date begun.*—1912.*Results.*—Full control effective under regulations.*Assignment.*—E. A. Back.*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Investigation of Foreign Fruit Offered for Entry:**

*Object.*—Investigations of fruits likely to be imported into the United States from Mediterranean or other countries in which the fruit fly is known to occur, as a basis for any necessary quarantine action.

*Cooperation.*—Federal Horticultural Board and experts of foreign countries.

*Location.*—Washington, D. C., and ports of entry; foreign countries.

*Date begun.*—1912.

*Results.*—Preliminary investigations made of Mediterranean countries; also Bermuda. Report ready for publication.

*Assignment.*—Special assignments.

*Proposed expenditures, 1914-15.*—\$3,200 (general expenses).

**Control of Foreign Fruit Offered for Entry:**

*Object.*—Inspection and regulation of entry of fruit imported into the United States from Mediterranean and other countries in which the fruit fly is known to occur.

*Cooperation.*—Federal Horticultural Board, United States post offices, Customs Service, State inspectors, and inspection service in foreign countries.

*Location.*—Washington, D. C., and ports of entry.

*Date begun.*—1912.

*Results.*—Information gained on the possibility of the fruit fly entering with imported fruit as a basis for any necessary quarantine measures.

*Assignment.*—Special assignments.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Total, Investigations of the Mediterranean Fruit Fly,** \$35,000 (general expenses, \$33,200; statutory, \$1,800).

**TROPICAL AND SUBTROPICAL FRUIT INSECT INVESTIGATIONS.****Supervision:**

*Object.*—General administration and direction of the investigations; routine laboratory and clerical work.

*Location.*—Washington, D. C.

*Date begun.*—1907.

*Assignment.*—C. L. Marlatt.

*Proposed expenditures, 1914-15.*—\$4,200 (general expenses, \$2,800; statutory, \$1,400).

**White Fly:**

*Object.*—To test on a commercial basis the practicability of control measures for the white fly recommended as a result of investigations of previous years.

*Cooperation.*—Florida Experiment Station and local grove owners.

*Location.*—Orlando, Fla., with experimental work in different sections of the State.

*Date begun.*—1907.

*Results.*—Satisfactory methods of control have been perfected, life history of the white fly determined, and predaceous and parasitic enemies studied; results reported in bulletins and circulars.

*Probable date of completion.*—July 1, 1915.

*Assignment.*—W. W. Yothers.

*Proposed expenditures, 1914-15.*—\$3,300 (general expenses).

**Citrus-Fruit Insects in California:**

*Object.*—To perfect the most economical and efficient method of gasing citrus groves and citrus nursery stock to combat scale insects and to investigate other citrus-fruit insects.

*Cooperation.*—County horticultural commissioners

*Location.*—Pasadena, Cal., and citrus belts of southern California (station formerly at Whittier).

*Date begun.*—1907.

*Results.*—Fumigation methods have been standardized, as indicated in Bulletins 79 and 90, Bureau of Entomology.

*Assignment.*—R. S. Woglum.

*Proposed expenditures, 1914-15.*—\$6,000 (general expenses).

**Citrus-Fruit Insects in Louisiana:**

*Object.*—To investigate and test various means of controlling injurious citrus insects.

*Cooperation.*—Local grove owners.

*Location.*—New Orleans, La., and citrus district of southern Louisiana.

*Date begun.*—1913.

*Results.*—Methods of controlling Argentine ant as it affects citrus fruits devised of sufficient promise to be now made subject of general orchard tests.

*Assignment.*—J. R. Horton.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Insects Affecting the Date Palm:**

*Object.*—To study the habits and methods of control of the two principal date-palm scale insects.

*Cooperation.*—County horticultural commissioners and State Experiment Station.

*Location.*—Mecca, Cal., with branch investigations in Arizona and Texas.

*Date begun.*—1913.

*Results.*—Life history and methods of control well under way.

*Probable date of completion.*—July 1, 1915.

*Assignment.*—J. D. Neüls.

*Proposed expenditures, 1914-15.*—\$2,500 (general expenses).

**Miscellaneous Subtropical Insects:**

*Object.*—Minor investigations of special forms of insect damage to tropical and subtropical fruits.

*Cooperation.*—As arranged; depending on the needs of the work.

*Location.*—Work directed from Washington, D. C.

*Date begun.*—1913.

*Assignment.*—Special assignment as needed.

*Proposed expenditures, 1914-15.*—\$500 (general expenses).

**Total, Tropical and Subtropical Fruit Insect Investigations, \$21,500**  
(general expenses, \$20,100; statutory, \$1,400).

**TRUCK-CROP AND STORED-PRODUCT INSECT INVESTIGATIONS.****SUPERVISION.****Supervision:**

*Object.*—To supervise the research projects and carry on routine office, laboratory, and field work incidental thereto.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—F. H. Chittenden.

*Proposed expenditures, 1914-15.*—\$6,620 (general expenses, \$3,500; statutory, \$3,120).

**INVESTIGATIONS OF TRUCK-CROP INSECTS.****Potato Insects:**

*Object.*—Effective control measures against the potato-tuber moth, Colorado potato beetle, potato eelworm, potato flea beetle, and miscellaneous potato insect pests.

*Cooperation.*—California State Horticultural Commission; Virginia Truck Experiment Station; Long Island Potato Growers' Association.

*Location.*—California; Norfolk, Va.; Riverhead, L. I., N. Y.

*Date begun.*—1907.

*Results.*—Effective control measures have been demonstrated for the potato-tuber moth; urgent quarantines established against infested districts; control of Colorado potato beetle by new insecticides; life histories of potato flea beetle and other insect pests.

*Assignment.*—J. E. Graf, F. A. Johnston, and D. E. Fink.

*Proposed expenditures, 1914-15.*—\$6,500 (general expenses).

**Onion Insects:**

*Object.*—Control measures for onion thrips, root maggots, and cutworms in attacks on onions.

*Cooperation.*—Southern Texas.

*Location.*—Colorado, Texas, Indiana, California.

*Date begun.*—1912.

*Results.*—Extensive control of onion thrips by means of nicotine sprays; control of cutworms on large acreage.

*Assignment.*—M. M. High.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Insects Affecting Crucifers:**

*Object.*—Control of various root maggots, cabbage aphid and looper, southern cabbage webworm, and other insects affecting cabbage, radish, and similar crops.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Norfolk, Va.; Texas. Work will probably also be undertaken in Washington State.

*Date begun.*—1912.

*Results.*—Control of cabbage looper and of aphides affecting crucifers by introduction of natural enemies.

*Assignment.*—F. A. Johnston, M. M. High, and D. E. Fink.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).

**Insects Affecting Cucurbits:**

*Object.*—Experiment in control of pickle and melon worms, cucumber beetles, and melon aphid.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Norfolk, Va.; Rocky Ford, Colo.; Imperial, Cal.

*Date begun.*—1909.

*Results.*—Control by introduced parasites of melon aphid accomplished; new control measures being developed for other cucurbit insect pests.

*Assignment.*—F. H. Chittenden.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Vegetable Truck and Garden Insects:**

*Object.*—The control of the pests of spinach, tomato, beans, peas, lettuce, and other miscellaneous truck crops.

*Cooperation.*—Virginia Truck Experiment Station.

*Location.*—Washington, D. C.; Norfolk, Va.; and in other States.

*Date begun.*—1905.

*Results.*—Improved methods of control of spinach aphid and asparagus insects.

*Assignment.*—F. H. Chittenden.

*Proposed expenditures, 1914-15.*—\$10,000 (general expenses).

**Total, Investigations of Truck-Crop Insects, \$24,500 (general expenses).**

**SUGAR-BEET INSECT INVESTIGATIONS.****Curly-Top and Other Sugar-Beet Leafhoppers:**

*Object.*—To relieve danger to beet crops, due to the attack of the curly-top, by devising control measures.

*Location.*—Oxnard, Cal.; Jerome, Idaho; Rocky Ford, Colo.; Glendale, Ariz.

*Date begun.*—1909.

*Results.*—Complete life history of sugar-beet leafhopper is being worked out and studies of injury to seed beets made.

*Assignment.*—C. F. Stahl, H. O. Marsh.

*Proposed expenditures, 1914-15.*—\$4,000 (general expenses).

**Miscellaneous Sugar-Beet Insects:**

*Object.*—Control of wireworm, leaf beetle, nematode, white grubs, leaf miner, grasshoppers, and other insect pests of sugar beets.

*Cooperation.*—State stations in California.

*Location.*—Los Angeles and Oxnard, Cal.; Rocky Ford, Colo.; Garden City, Kans.; Jerome, Idaho; Glendale, Ariz.

*Date begun.*—1908.

*Results.*—Control of sugar-beet webworm and leaf beetle by spray methods; control measures for beet wireworm developed and demonstrated.

*Assignment.*—J. E. Graf, H. O. Marsh, F. B. Milliken.

*Proposed expenditures, 1914-15.*—\$4,500 (general expenses).

**Total, Sugar-Beet Insect Investigations, \$8,500 (general expenses).**

**INVESTIGATIONS OF STORED-PRODUCT INSECTS.****Investigations of Stored-Product Insects:**

*Object.*—To diminish injury by insects infesting mills, granaries, and warehouses, including the Mediterranean flour moth, flour beetles, and grain weevils, cowpea and bean weevils, and grain beetles.

*Location.*—Texas, Kansas, Virginia, New York, California, and Washington, D. C.

**Investigations of Stored-Product Insects—Continued.**

*Date begun.*—1908.

*Results.*—Improved application of known remedies and new methods devised; insect-proof cartons for cereals and dried fruits prepared; and methods of sterilization for mill products devised.

*Assignment.*—F. H. Chittenden, C. H. Popenoe.

*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).

**Total, Truck-Crop and Stored-Product Insect Investigations, \$44,620** (general expenses, \$41,500; statutory, \$3,120).

**BEE-CULTURE INVESTIGATIONS.****Supervision:**

*Object.*—To supervise the research activities and carry on administrative and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—Early in department history.

*Assignment.*—E. F. Phillips.

*Proposed expenditures, 1914-15.*—\$2,911.

**Wintering of Bees:****(a) REACTION TO TEMPERATURE CHANGES—**

*Object.*—To determine the various methods by which bees respond to changes in external temperature.

*Cooperation.*—University of Pennsylvania.

*Location.*—Washington, D. C.; Philadelphia, Pa.

*Date begun.*—1912.

*Results.*—The reaction of the colony to changes in external temperature and the effects of various irritations determined; published in Department Bulletin No. 93.

*Assignment.*—E. F. Phillips.

*Proposed expenditures, 1914-15.*—\$6,000 (cost of succeeding subproject (b) included in this amount).

**(b) CARE DURING WINTER—**

*Object.*—To determine the best methods of caring for bees during winter.

*Cooperation.*—University of Pennsylvania.

*Location.*—Philadelphia, Pa.

*Date begun.*—1912.

*Results.*—Same as preceding subproject.

*Assignment.*—E. F. Phillips.

**Diseases of Bees:**

*Object.*—To determine the causes of the various diseases which affect the brood and adult bees.

*Cooperation.*—State Entomologist of Wisconsin.

*Location.*—Washington, D. C.; Madison, Wis.

*Date begun.*—1907.

*Results.*—The thermal death point of the four known pathogenic organisms has been determined; published as Department Bulletin No. 92.

*Assignment.*—G. F. White.

*Proposed expenditures, 1914-15.*—\$4,037.

**Development of Bees:****(a) DEVELOPMENT IN THE EGG—**

*Object.*—To thoroughly investigate the phenomena connected with the development of the bee in the egg.

*Location.*—Washington, D. C.

*Date begun.*—1908.

*Results.*—An extensive paper on the development in the egg is nearly complete; several papers issued in technical journals.

*Probable date of completion.*—1914.

*Assignment.*—James A. Nelson.

*Proposed expenditures, 1914-15.*—\$1,800 (cost of succeeding subproject (b) included in this amount).

**(b) DEVELOPMENT OF THE LARVA—**

*Object.*—To investigate the morphology of the larva from the hatching of the egg to the beginning of pupation.

*Location.*—Washington, D. C.

*Date begun.*—1913.

**Development of Bees—Continued.**

*Results.*—The investigation will be continued until its completion, probably in about one year, when results will be published.

*Probable date of completion.*—1915.

*Assignment.*—James A. Nelson.

**Sense Organs of Bees:****(a) STRUCTURE AND FUNCTIONS—**

*Object.*—To determine the structure and functions of the scent organs of the bee.

*Location.*—Washington, D. C.; Chevy Chase, Md.

*Date begun.*—1913.

*Results.*—Structure determined; manuscript presented to technical journal for publication.

*Probable date of completion.*—August, 1914.

*Assignment.*—N. E. McAdoo.

*Proposed expenditures, 1914-15.*—\$25.

**(b) INFLUENCE OF ODORS ON ACTIVITY—**

*Object.*—To study the influence of odors on activity, especially those produced by the bees.

*Location.*—Washington, D. C.; Chevy Chase, Md.

*Date begun.*—1913.

*Results.*—No conclusive results yet obtained.

*Assignment.*—N. E. McAdoo.

*Proposed expenditures, 1914-15.*—\$1,575.

**Wax Production:**

*Object.*—To determine the optimum conditions under which wax is secreted by the bees.

*Location.*—Austin, Tex.

*Date begun.*—1913.

*Results.*—Preliminary experiments only have so far been made.

*Assignment.*—D. B. Casteel.

*Proposed expenditures, 1914-15.*—\$12.

**Total, Bee-Culture Investigations,** \$16,360 (general expenses, \$15,000; statutory \$1,360).

**MISCELLANEOUS INSECT INVESTIGATIONS.****SUPERVISION.****Supervision:**

*Object.*—To supervise the investigations and carry on administrative and clerical work necessary for their proper conduct.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Assignment.*—Under direct supervision of Chief of Bureau.

*Proposed expenditures, 1914-15.*—Cost, nominal; work incidental to project, "General bureau administration."

**IDENTIFICATION AND CLASSIFICATION OF INSECTS.<sup>1</sup>****Identification and Classification of Insects:**

*Object.*—To name, classify, and establish the systematic relationships of all insects which are being studied biologically in the course of investigations of the bureau, and to identify similar material sent in for this purpose by the agricultural colleges and experiment stations and by scientific workers.

*Cooperation.*—United States National Museum, which houses the collections and provides working rooms.

*Location.*—Washington, D. C.

*Date begun.*—1879.

*Results.*—Used in correspondence, in publications of the Bureau, and by employees engaged in biological studies in the field.

*Assignment.*—Nathan Banks, A. N. Caudell, H. G. Dyar, Otto Heidemann, Frederick Knab, Theodore Pergande, E. A. Schwarz, and Rolla P. Currie.

*Proposed expenditures, 1914-15.*—\$32,511 (general expenses, \$26,231; statutory, \$6,280).

<sup>1</sup> Practically every year some unexpected and unusual outbreak occurs, frequently of some insect which has not been carefully studied, making it necessary to conduct immediate field investigations. Such funds as are needed for this immediate emergency investigation are as a rule drawn from this allotment, and the special experts of the identification-work assignment are used in such cases so far as possible.

## INVESTIGATIONS OF INSECTS AFFECTING THE HEALTH OF MAN.

**Eradication of Spotted Fever Tick in Montana:**

*Object.*—To reduce or eradicate spotted fever in the Bitter Root Valley by control of the tick which transmits it.

*Cooperation.*—Montana Agricultural College Experiment Station and board of entomology.

*Location.*—Bitter Root Valley, Mont.

*Date begun.*—1913.

*Results.*—Determination of practical means of control.

*Assignment.*—W. D. Hunter, R. A. Cooley, W. V. King, and H. P. Wood.

*Proposed expenditures, 1914-15.*—\$8,319 (general expenses).

**Malarial Prophylaxis:**

*Object.*—To determine requirements for protection of individuals on plantations and elsewhere against malarial mosquitoes.

*Cooperation.*—Maxwell-Yerger Plantation Co., Mound, La.

*Location.*—Mound, La.

*Date begun.*—1913.

*Results.*—Determination of the average time and money loss on a large cotton plantation due to malaria.

*Assignment.*—D. L. Van Dine, Ed. Foster, and F. H. O'Neill.

*Proposed expenditures, 1914-15.*—\$5,410 (general expenses).

**Possible Insect Transmission of Pellagra:**

*Object.*—To determine from consideration of life history, habits, and distribution whether any species of insects can be determined to be the transmitter of pellagra, and to devise means of control.

*Cooperation.*—Thompson Pellagra Commission.

*Location.*—Spartansburg, S. C.

*Date begun.*—1911.

*Results.*—Determination of the probability that certain kinds of flies carry pellagra.

*Assignment.*—A. H. Jennings.

*Proposed expenditures, 1914-15.*—\$2,600 (general expenses).

**House-Fly Control in Manure:**

*Object.*—To determine means of controlling the house fly in manure without destroying the fertilizer value.

*Cooperation.*—Bureaus of Chemistry, Plant Industry, and Animal Industry.

*Location.*—Arlington, Va.; Bethesda, Md.; New Orleans, La.

*Date begun.*—1913.

*Results.*—Determination of the utility of borax in controlling flies.

*Assignment.*—R. H. Hutchison.

*Proposed expenditures, 1914-15.*—\$2,550 (general expenses).

**Total, Investigations of Insects Affecting the Health of Man,** \$18,879 (general expenses).

## INVESTIGATIONS OF INSECTS AFFECTING THE HEALTH OF ANIMALS.

**Tick Life History:**

*Object.*—To complete records on the life history of the Texas fever tick, spinose ear tick, lone star tick, fowl tick, and other important North American species, especially to determine longevity of the various stages, in order to perfect rotation systems.

*Location.*—Dallas, Tex.

*Date begun.*—1905.

*Results.*—The rotation of pasture system of control of the fever tick arose from these investigations.

*Assignment.*—F. C. Bishopp.

*Proposed expenditures, 1914-15.*—\$3,920 (general expenses).

**Stable Fly:**

*Object.*—To study the life history of the stable fly and devise methods of control by artificial and natural means.

*Location.*—Dallas, Tex.

*Date begun.*—1912.

*Results.*—The utility and means of propagation of parasites have been determined.

*Assignment.*—F. C. Bishopp.

*Proposed expenditures, 1914-15.*—\$1,125 (general expenses).

**Miscellaneous Insects Affecting Live Stock:**

*Object.*—To devise means of control of various insect pests affecting live stock including horn fly, horseflies, screw worms, warbles, fleas, and lice.

*Location.*—Dallas, Tex.

*Date begun.*—1912.

*Results.*—Only preliminary information has been gained in most of these cases.

*Assignment.*—F. C. Bishopp.

*Proposed expenditures, 1914-15.*—\$4,125 (general expenses).

**Total, Investigations of Insects Affecting the Health of Animals, \$9,170**  
(general expenses).

**Total, Miscellaneous Insect Investigations, \$60,560** (general expenses, \$54,280; statutory, \$6,280).

**MOTH INVESTIGATIONS.****SUPERVISION.****Supervision:**

*Object.*—To supervise the expenditure of the appropriation for preventing the spread of moths by means of administering quarantine, by inspecting and treating infested territory for the purpose of preventing spread, by conducting experimental work with parasites and natural enemies, and by studying critically the habits of the insects concerned and their relation to tree growth.

*Cooperation.*—State entomologists, officials in charge of moth work, State nursery inspectors and foresters.

*Location.*—Main office, Boston, Mass. Infested territory covers about one-third of the area of the New England States; also isolated colonies in New York and Ohio.

*Date begun.*—1906.

*Assignment.*—A. F. Burgess.

*Proposed expenditures, 1914-15.*—\$9,900 (preventing spread of moths, \$3,500; statutory, \$6,400).

**EXPERIMENTAL WORK.****Insects Parasitic on Moths:**

*Object.*—To introduce foreign parasites and natural enemies of these insects; to study their habits and natural history; to determine the extent to which they are increasing in this country and their value under field conditions.

*Cooperation.*—State experiment stations, entomologists, and moth superintendents in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

*Location.*—Portland, Me.; Rochester and Concord, N. H.; Melrose Highlands, Mass.; and a large number of localities in the New England States where parasitic material has been liberated.

*Date begun.*—1906.

*Results.*—Information disseminated as to character and habits of the parasites imported and their value in moth control.

*Probable date of completion.*—Introduction practically completed; investigations continuous for several years.

*Assignment.*—J. N. Summers, S. S. Crossman.

*Proposed expenditures, 1914-15.*—\$14,100 (preventing spread of moths.)

**Natural Increase of Gipsy Moth Under Field Conditions:**

*Object.*—To determine the natural increase of the gipsy moth under field conditions, and the relation of food plants, natural enemies, etc., to the control of this insect.

*Location.*—Studies are being made in 250 selected infested localities in Maine, New Hampshire, and Massachusetts.

*Date begun.*—1911.

*Results.*—Several relations of natural enemies to moth increase determined.

*Probable date of completion.*—February 1, 1917.

*Assignment.*—C. W. Minott.

*Proposed expenditures, 1914-15.*—\$23,850 (preventing spread of moths).

**Feeding Habits of Gipsy Moth:**

*Object.*—To determine the feeding habits of gipsy-moth larvæ in all stages and the food plants upon which this species can not develop.

*Location.*—Melrose Highlands, Mass.

*Date begun.*—1912.

**Feeding Habits of Gipsy Moth—Continued.**

*Results.*—Relation of food plants to increase of gipsy moth partially determined.

*Probable date of completion.*—June 30, 1915.

*Assignment.*—F. H. Mosher.

*Proposed expenditures, 1914-15.*—\$7,480 (preventing spread of moths).

**Relation of "Wilt" Disease to Gipsy-Moth Control:**

*Object.*—To determine the identity of the disease known as the "wilt," and its relation and effect on the increase of the gipsy moth.

*Cooperation.*—Bussey Institution of Harvard University.

*Location.*—Melrose Highlands, Worcester, and Forest Hills, Mass.

*Date begun.*—1912.

*Results.*—Information secured on dissemination of this disease; also much information obtained as to its identity.

*Probable date of completion.*—January 1, 1916.

*Assignment.*—R. W. Glaser.

*Proposed expenditures, 1914-15.*—\$6,420 (preventing spread of moths).

**Secondary Insects:**

*Object.*—To determine the effect of secondary insects on trees that have been defoliated by the gipsy moth.

*Location.*—Selected areas in Maine, New Hampshire, and Massachusetts.

*Date begun.*—1913.

*Results.*—Relation of secondary insects to death of defoliated trees partially determined.

*Probable date of completion.*—1916.

*Assignment.*—H. A. Preston.

*Proposed expenditures, 1914-15.*—\$2,840 (preventing spread of moths).

**Dispersion of Gipsy Moth:**

*Object.*—To determine the means by which the gipsy moth spreads to new territory.

*Cooperation.*—State foresters of New Hampshire and Massachusetts.

*Location.*—Selected areas in Maine, New Hampshire, and Massachusetts.

*Date begun.*—1911.

*Results.*—Relation of air currents to dispersion of gipsy-moth caterpillars determined; published in Bulletin 119.

*Probable date of completion.*—1916.

*Assignment.*—C. W. Collins.

*Proposed expenditures, 1914-15.*—\$5,520 (preventing spread of moths).

**Relation of Silviculture to Moth Infestation and Control:**

*Object.*—To determine the relation of silvicultural condition to gipsy-moth infestation, and to demonstrate the best methods of handling forest growth so as to render it unfavorable to gipsy-moth attack; to determine the most profitable utilization of products cut.

*Cooperation.*—Forest Service, State foresters, entomologists, and moth superintendents in the infested territory.

*Location.*—Selected woodlots in the infested territory in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

*Date begun.*—1913.

*Results.*—Experiments have not been conducted for a sufficient length of time to show permanent results.

*Assignment.*—G. E. Clement.

*Proposed expenditures, 1914-15.*—\$18,000 (preventing spread of moths).

**Miscellaneous:**

*Object.*—To maintain the gipsy-moth laboratory and storehouse, and carry on such work in foreign countries as may be necessary to secure natural enemies or information on parasites and diseases of the gipsy moth.

*Cooperation.*—Entomologists in foreign countries.

*Location.*—Indeterminate.

*Date begun.*—1906.

*Results.*—About 30 species of parasites and natural enemies have been introduced, and of these 7 species are increasing and assisting in controlling the gipsy moth and the brown-tail moth.

*Assignment.*—A. F. Burgess.

*Proposed expenditures, 1914-15.*—\$8,290 (preventing spread of moths).

**Total, Experimental Work, \$86,500 (preventing spread of moths).**

## FIELD WORK.

**Quarantine Work:**

*Object.*—To provide for the inspection of plants and forest products in order to prevent the dissemination of the gipsy moth and the brown-tail moth from infested areas.

*Cooperation.*—State entomologists and inspectors in the infested territory.

*Location.*—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

*Date begun.*—1912.

*Results.*—This work has resulted in preventing the spread of the gipsy moth and the brown-tail moth in many localities outside of the present infested area.

*Assignment.*—D. M. Rogers.

*Proposed expenditures, 1914-15.*—\$50,000 (preventing spread of moths).

**Scouting Work:**

*Object.*—To determine the area infested by the gipsy moth and the brown-tail moth, for the purpose of preventing the spread of these insects and to apply exterminative measures in the territory where the best results can be secured in suppressing these pests.

*Cooperation.*—State entomologists, foresters, and moth superintendents in the States concerned.

*Location.*—New England, New York, and Ohio.

*Date begun.*—1906.

*Results.*—The spread of the gipsy moth is determined annually and many infestations in the outside territory have been exterminated.

*Assignment.*—L. H. Worthley.

*Proposed expenditures, 1914-15.*—\$174,320 (preventing spread of moths, \$170,000; statutory, \$4,320).

**Total, Field Work, \$224,320** (preventing spread of moths, \$220,000; statutory, \$4,320).

**Total, Preventing Spread of Moths, \$320,720** (preventing spread of moths, \$310,000; statutory, \$10,720).

## BUREAU OF BIOLOGICAL SURVEY.

## GENERAL BUREAU ADMINISTRATION.

**General Bureau Administration:**

*Object.*—To administer the investigational work of the bureau, carry on its business and routine laboratory operations, maintain library, etc.

*Location.*—Washington, D. C.

*Date begun.*—1885.

*Assignment.*—H. W. Henshaw, T. S. Palmer, A. B. Morrison.

*Proposed expenditures, 1914-15.*—\$32,040 (general expenses, \$15,000; statutory, \$17,040).

## GAME PRESERVATION.

## ENFORCEMENT OF THE LACEY ACT.

**Supervision:**

*Object.*—To carry on supervisory and necessary clerical and other routine work.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Assignment.*—T. S. Palmer.

*Proposed expenditures, 1914-15.*—\$5,800 (general expenses, \$2,500; statutory, \$3,300).

**Importation of Foreign Mammals and Birds:**

*Object.*—To prevent introduction from foreign countries of injurious birds and mammals.

*Cooperation.*—Customs Service, Treasury Department.

*Location.*—Washington, D. C., New York, Philadelphia, San Francisco, Honolulu.

*Date begun.*—1900.

*Results.*—Five hundred and nine permits issued during the last fiscal year for the importation of birds and mammals.

*Assignment.*—Inspectors.

*Proposed expenditures, 1914-15.*—\$3,000 (general expenses, \$2,000; statutory, \$1,000).

**Inspection and Quarantine of Quails:**

*Object.*—Quarantine and inspection of birds to prevent introduction of quail diseases into the United States from northern Mexico.

*Cooperation.*—Undecided.

*Location.*—Brownsville, Tex.

*Date begun.*—July 1, 1914.

*Assignment.*—Undecided.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Interstate Commerce in Game:**

*Object.*—To secure enforcement of act regulating interstate shipment of game. Evidence of violations of Federal game laws is collected, transmitted to the Department of Justice and to State officials through the Solicitor's office, and expert testimony given when necessary.

*Cooperation.*—Solicitor's office; Department of Justice; State game officials.

*Location.*—Arkansas, Michigan, Kentucky, Maryland, Pennsylvania, Tennessee, Virginia, Washington, D. C.

*Date begun.*—1909.

*Results.*—Evidence secured of large number of violations of this act, resulting in many convictions and fines assessed. This has resulted in stopping a large amount of illegal traffic in game, numerous dealers refusing to receive further shipments.

*Assignment.*—T. S. Palmer.

*Proposed expenditures, 1914-15.*—\$11,250 (general expenses, \$7,000; statutory, \$4,250).

**Publication of Information Concerning Game Birds:**

*Object.*—Compilation, publication, and distribution of information concerning game birds and interstate commerce in game.

*Cooperation.*—State authorities.

*Location.*—Washington, D. C.

*Date begun.*—1900.

*Results.*—Bulletins issued concerning game laws; also directories of game officials and societies for the protection of birds.

*Assignment.*—T. S. Palmer, W. F. Bancroft, F. L. Earnshaw.

*Proposed expenditures, 1914-15.*—\$3,500 (general expenses).

**Total, Enforcement of the Lacey Act,** \$24,550 (general expenses, \$16,000; statutory, \$8,550).

**ESTABLISHMENT AND MAINTENANCE OF MAMMAL AND BIRD RESERVATIONS.****Supervision:**

*Object.*—To carry on supervisory and necessary clerical and other routine work.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Assignment.*—T. S. Palmer, W. F. Bancroft.

*Proposed expenditures, 1914-15.*—\$2,900 (general expenses, \$2,300, maintenance of mammal and bird reservations; statutory, \$600).

**General Maintenance of Reservations and Refuges:**

*Object.*—Maintenance of areas set apart by Executive order or acts of Congress as breeding refuges for birds and game mammals and placed in charge of the Biological Survey.

*Cooperation.*—National Association of Audubon Societies, National Bison Society, State game officials.

*Location.*—Seventeen States, Alaska, Hawaii, Porto Rico.

*Date begun.*—1909.

*Results.*—Warden service maintained, improved conditions, and increase in bird life reported.

*Assignment.*—T. S. Palmer, district inspectors and wardens.

*Proposed expenditures, 1914-15.*—\$13,400 (maintenance of mammal and bird reservations).

**Bison Range:**

*Object.*—Maintenance of reservation and care of the herds of buffaloes and other big game animals which may be transferred to the range.

*Location,* Dixon, Mont. †

*Date begun.*—1908.

**Bison Range—Continued.**

*Results.*—Fourteen buffalo calves born on range, increasing the herd to 110 head.

*Assignment.*—A. R. Hodges.

*Proposed expenditures, 1914-15.*—\$3,000 (maintenance of mammal and bird reservations, \$1,800; statutory, \$1,200).

**Restocking Reservations:**

*Object.*—To stock national game preserves and other reservations with big game and game birds adapted thereto.

*Cooperation.*—Department of Interior and Forest Service.

*Location.*—Rocky Mountain States.

*Date begun.*—1911.

*Results.*—Twenty-two elks and 14 buffaloes transferred to Wind Cave Park, S. Dak.; one deer, 12 wild geese, and 24 pheasants transferred to Niobrara Game Preserve, Nebr.

*Assignment.*—Reservation inspectors.

*Proposed expenditures, 1914-15.*—\$2,500 (game for national reservations).

**Winter Elk Refuge:**

*Object.*—To insure perpetuation of elk in Wyoming by establishing a permanent winter refuge on which sufficient hay may be raised for the animals, and thus avoid purchasing feed from time to time at excessive prices; to feed elk in winter and take other steps necessary to insure the preservation of the species in the State.

*Location.*—Jackson Hole, Wyo.

*Date begun.*—1912.

*Results.*—Negotiations for land for refuge nearly completed.

*Assignment.*—D. C. Nowlin.

*Proposed expenditures, 1914-15.*—\$49,800<sup>1</sup> (Winter Elk Refuge in Wyoming). For land, \$45,000; for maintenance, \$4,800<sup>1</sup>.

**Aleutian Islands Reservation:**

*Object.*—Protection of birds, propagation of reindeer, and general development of reservation.

*Cooperation.*—Bureau of Fisheries, Bureau of Education, and Revenue Cutter Service.

*Location.*—Aleutian Islands, Alaska.

*Date begun.*—1913.

*Results.*—Herd of 56 reindeer placed on Dutch Harbor and Umnak Islands, Alaska, and keeper provided.

*Assignment.*—T. S. Palmer.

*Proposed expenditures, 1914-15.*—\$1,000 (maintenance of mammal and bird reservations).

**Sullys Hill National Game Preserve:**

*Object.*—Improvement of game preserve in Sullys Hill National Park by construction of fence, sheds, buildings, and corrals necessary for the proper care and maintenance of animals and birds to be placed therein.

*Location.*—Sullys Hill National Park, N. Dak.

*Date begun.*—July 1, 1914.

*Assignment.*—T. S. Palmer.

*Proposed expenditures, 1914-15.*—\$5,000 (Sullys Hill National Park).

**Wind Cave Preserve:**

*Object.*—To establish a national game preserve in Wind Cave National Park.

*Cooperation.*—American Bison Society; Department of Interior.

*Location.*—Wind Cave National Park, S. Dak.

*Date begun.*—1912.

*Results.*—Temporary inclosures and sheds provided for herds of buffaloes and elks; contracts mostly let for material and labor for construction of inclosure to park.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—F. M. Dille.

*Proposed expenditures, 1914-15.*—\$14,000<sup>2</sup> (Wind Cave National Game Preserve).

**Total, Establishment and Maintenance of Mammal and Bird Reservations,** \$91,600 (general expenses, \$89,800; statutory, \$1,800.)

**Total, Game Preservation,** \$116,150 (general expenses, \$105,800; statutory, \$10,350).

<sup>1</sup> \$49,800 carried over from fiscal year 1914.

<sup>2</sup> Carried over from fiscal year 1914.

## ENFORCEMENT OF THE MIGRATORY BIRD LAW.

### Supervision:

*Object.*—To carry on supervisory and necessary clerical and other routine work.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Assignment.*—H. W. Henshaw.

*Proposed expenditures, 1914-15.*—\$7,000 (general expenses).

### Migratory Bird Protection:

*Object.*—Protection of migratory water fowl, shore birds, and insectivorous birds.

*Cooperation.*—Warden service of the several States, and State game protective associations.

*Location.*—Washington, D. C., and the United States as a whole.

*Date begun.*—1913.

*Results.*—Preliminary organization established in many States.

*Assignment.*—H. W. Henshaw.

*Proposed expenditures, 1914-15.*—\$43,000 (general expenses).

**Total, Enforcement of the Migratory Bird Law, \$50,000 (general expenses).**

## INVESTIGATIONS OF BIRDS AND MAMMALS IN RELATION TO AGRICULTURE.

### Supervision:

*Object.*—To carry on supervisory and necessary routine laboratory and office work.

*Location.*—Washington, D. C.,

*Date begun.*—1909.

*Assignment.*—A. K. Fisher.

*Proposed expenditures, 1914-15.*—\$6,200 (general expenses, \$5,000; statutory, \$1,200).

### Relation of Birds to Agriculture:

*Object.*—Field observations and laboratory investigations of birds' stomachs, and preparation of reports concerning foods of native birds, for use of farmers, fruit growers, and foresters. Beneficial and injurious species are determined and recommendations made for their protection or control. Present plans will include work on food of ducks, mocking birds, thrashers, and Panama birds; investigations of the damage done to oysters by ducks in Puget Sound region.

*Location.*—Washington, D. C., and various points throughout the United States.

*Date begun.*—1905.

*Results.*—Information disseminated in relation to economic value of birds; reports published.

*Assignment.*—F. E. L. Beal, W. L. McAtee.

*Proposed expenditures, 1914-15.*—\$19,000 (general expenses).

### Relation of Native Mammals to Agriculture:

*Object.*—To investigate the relation of wild animals, especially rodents and carnivores, to agriculture, and to devise and demonstrate methods for the control of the injurious species. The national forests, national parks, and bird reservations are infested with numerous mammals which are extremely destructive to live stock, nursery and fruit trees, pasturage, and other vegetation, and largely reduce the value and revenue from these sources. Plans include experiments for the control of moles, pocket gophers, prairie dogs, and wolves and other predaceous animals.

*Cooperation.*—Forest Service; United States Reclamation Service; North Dakota Agricultural College; county commissioners of the State of Idaho.

*Location.*—Washington, D. C., and various points throughout the United States.

*Date begun.*—1905.

*Results.*—At the end of the fiscal year 1914 work finished in Cochetopa National Forest and work practically completed in the Pike National Forest. In the Coconino National Forest about 50,000 acres cleared of prairie dogs.

*Assignment.*—S. E. Piper, A. K. Fisher, D. E. Lantz.

*Proposed expenditures, 1914-15.*—\$60,000 (general expenses).

### Control of Crawfish in Cotton and Corn Fields:

*Object.*—To devise and demonstrate methods for the economic control of crawfish in the Houston clay and black prairie areas of Mississippi and Alabama, where they materially damage crops.

*Cooperation.*—C. C. Ewing and A. J. Evans, Muldon, Miss., and A. H. Bush, Macon, Miss., who furnish and prepare the ground.

**Control of Crawfish in Cotton and Corn Fields—Continued.***Location.*—Muldon and Macon, Miss.*Date begun.*—1912.*Results.*—Methods for successful control of crawfish in Mississippi and Alabama are being perfected.*Assignment.*—A. K. Fisher.*Proposed expenditures, 1914-15.*—\$3,000 (general expenses).**Destruction of Ground Squirrels in National Forests:***Object.*—Experimental and general work in destroying ground squirrels in national forests. These animals are always serious enemies of agriculture and recently have been discovered to be carriers of plague in California.*Location.*—Mainly in California. Work to be carried to various national forests when notified by Forest Service that serious depredations occur.*Date begun.*—1909.*Results.*—During the fiscal year 1914 about 65,000 acres in the following national forests were cleared of ground squirrels: Kern, Sequoia, Monterey, San Benito, and Modoc.*Assignment.*—A. K. Fisher, S. E. Piper.*Proposed expenditures, 1914-15.*—\$15,000 (general expenses).**Total, Investigations of Birds and Mammals in Relation to Agriculture,**  
\$103,200 (general expenses, \$102,000; statutory, \$1,200).**REARING OF FUR-BEARING ANIMALS.****Rearing of Fur-Bearing Animals:***Object.*—To develop superior types of fur-bearing animals, such as fox, mink, marten, otter, and raccoon, and to place the rearing of fur-bearing animals on an economic basis; also to utilize the Aleutian Islands as breeding grounds for blue foxes and other valuable fur bearers.*Cooperation.*—National Zoological Park, Washington, D. C., in purchasing animals and furnishing cages.*Location.*—Washington, D. C.; Prichard, Idaho; Aleutian Islands Reservation, Alaska.*Date begun.*—1912.*Results.*—Successful breeding of minks at Prichard, Idaho, and national zoological stations.*Assignment.*—A. K. Fisher, W. G. Gates, Ned Dearborn.*Proposed expenditures, 1914-15.*—\$8,000 (general expenses).**DISEASE OF WILD DUCKS.****Investigating Disease of Wild Ducks in Salt Lake Valley, Utah:***Object.*—To study local conditions for the purpose of determining the cause of the malady among waterfowl, and to devise methods for its control and suppression.*Location.*—Salt Lake Valley, Utah.*Date begun.*—1914.*Assignment.*—A. K. Fisher, Alex. Wetmore.*Proposed expenditures, 1914-15.*—\$5,000 (general expenses).**BIOLOGICAL INVESTIGATIONS.****Supervision:***Object.*—To carry on supervisory and necessary clerical and other routine work.*Location.*—Washington, D. C.*Date begun.*—1909.*Assignment.*—E. W. Nelson.*Proposed expenditures, 1914-15.*—\$1,875 (general expenses, \$1,275; statutory, \$600).**Bird Migration:***Object.*—To secure accurate data on the migratory movements of game and other birds, and their breeding and wintering locations, to serve as a basis for the conservation of useful species and for use in the formulation of regulations under the Federal migratory bird act.*Cooperation.*—About 250 volunteer observers in all parts of the United States and Canada.

**Bird Migration—Continued.**

*Location.*—Washington, D. C., and throughout the United States and Canada.

*Date begun.*—1909.

*Results.*—A vast amount of data in reference files and various bulletins and papers published; maps prepared showing the time and routes of migration of various birds; other bulletins in course of preparation.

*Assignment.*—E. W. Nelson, W. W. Cooke.

*Proposed expenditures, 1914-15.*—\$3,475 (general expenses, \$2,350; statutory, \$1,125).

**Native Birds and Mammals of the Public Domain:**

*Object.*—To secure for publication accurate information concerning the wild life of the public domain for the better conservation of the valuable species and the destruction of the harmful ones. These data will enable areas to be selected for restocking with game birds and animals; give similar information concerning the fur-bearing mammals, many of the more valuable species of which are threatened with extinction; and show the distribution and abundance of injurious species, as wolves, mountain lions, prairie dogs, and ground squirrels, and furnish a basis for plans for their destruction.

*Cooperation.*—Forest Service, Bureau of Fisheries, and numerous individuals in various States.

*Location.*—Field work in Arizona, Oregon, North Dakota, and Wyoming; also in Alberta, British Columbia, and Yukon Territory; office investigations at Washington, D. C.

*Date begun.*—1913.

*Results.*—Field investigations conducted in Grand Canyon, National Monument, and the Coconino, Apache, and Crook National Forests, Ariz., during 1913-14.

*Assignment.*—E. W. Nelson, Vernon Bailey.

*Proposed expenditures, 1914-15.*—\$6,795 (general expenses, \$5,970; statutory, \$825).

**Biological Surveys of the States and Territories:**

*Object.*—To supply the great and constantly increasing demand for information concerning the distribution and habits of our native birds and mammals, and for data regarding the natural climatic belts or zones in each area.

*Cooperation.*—State and other institutions and individuals. California: Cooper Ornithological Club members, Museum of Vertebrate Zoology, and California Academy of Sciences. North Dakota: State University, State Agricultural College, State fish and game commission. South Dakota: State University. Oregon: State fish and game commission, State University.

*Location.*—Field work in Alabama, Arizona, North Dakota, Wyoming, and Oregon; office investigations at Washington, D. C.

*Date begun.*—About 1889.

*Results.*—Field work of surveys completed, and reports partly published on Texas, New Mexico, Colorado, and Arkansas. Work nearly done in Wyoming and in an advanced stage in North Dakota, California, and numerous other States. Preliminary life-zone map of North America published. Much office investigation in this connection already done.

*Assignment.*—E. W. Nelson, Vernon Bailey.

*Proposed expenditures, 1914-15.*—\$18,555 (general expenses, \$16,905; statutory, \$1,650).

**Total, Biological Investigations, \$30,700** (general expenses, \$26,500; statutory, \$4,200).

**DIVISION OF PUBLICATIONS.****PUBLICATION WORK OF THE DEPARTMENT OF AGRICULTURE.****Administration:**

*Object.*—To supervise the publication work of the department and expenditures of the general printing fund.

*Cooperation.*—All branches of the department and Government Printing Office.

*Location.*—Washington, D. C.

*Date begun.*—1890.

*Assignment.*—J. A. Arnold, B. D. Stallings, and A. I. Mudd.

*Proposed expenditures, 1914-15.*—\$23,170 (general expenses, \$2,900; statutory, \$20,270).

The division is also charged with the administration and expenditure of the general printing fund of \$500,000, appropriated to the Public Printer under the sundry civil act.

**Editorial Work:**

**Object.**—To edit and prepare for printing all manuscripts approved for publication, revise and correct proofs of the same, prepare forms and blanks for the job work of the department.

**Location.**—Washington, D. C.

**Date begun.**—1890.

**Assignment.**—B. D. Stallings.

**Proposed expenditures, 1914-15.**—\$19,680 (general expenses, \$700; statutory, \$18,980).

**Indexing:**

**Object.**—To prepare indexes to publications and to card index, by subjects, all publications issued by department.

**Location.**—Washington, D. C.

**Date begun.**—1905.

**Assignment.**—C. H. Greathouse.

**Proposed expenditures, 1914-15.**—\$10,970 (general expenses, \$350; statutory, \$10,620).

**Illustration Work:**

**Object.**—To prepare drawings and photographs for use in illustrating publications of the department, for official record, and for lectures; to make lantern slides for official use and furnish them, as well as photographs, to applicants at the price authorized by law. The work includes the production of moving pictures of the department's activities, for educational purposes.

**Location.**—Washington, D. C.

**Date begun.**—1894.

**Assignment.**—A. B. Boettcher.

**Proposed expenditures, 1914-15.**—\$30,730 (general expenses, \$6,750; statutory, \$23,980).

**Distribution of Documents:**

**Object.**—To cooperate with the Government Printing Office in the distribution of department publications; to duplicate and distribute press notices, circular letters, and blank forms; and to maintain special and general lists of addresses to which department publications are mailed.

**Cooperation.**—Government Printing Office.

**Location.**—Washington, D. C.

**Date begun.**—1896.

**Assignment.**—F. J. P. Cleary.

**Proposed expenditures, 1914-15.**—\$104,950 (general expenses, \$8,050; statutory, \$96,900).

**Total, Publication Work of the Department of Agriculture,** \$189,500 (general expenses, \$18,750; statutory, \$170,750), exclusive of \$500,000 general printing fund.

**BUREAU OF CROP ESTIMATES.****ADMINISTRATION.****Administration:**

**Object.**—To reorganize, administer, and supervise the work of the bureau in Washington and in the field. Certain changes in personnel, details, and assignment of duties in the administrative office are proposed in accordance with plans already formulated.

**Cooperation.**—Various bureaus and departments.

**Location.**—Washington, D. C.

**Date begun.**—1863.

**Results.**—Better organization, coordination, cooperation, and greater efficiency in the conduct of the work of the bureau.

**Assignment.**—Leon M. Estabrook and Nat C. Murray.

**Proposed expenditures, 1914-15.**—\$28,684 (general expenses, \$6,144; statutory, \$22,540).

## CROP REPORTING.

**Collecting and Reporting Domestic Crop Data:**

*Object.*—To collect and report periodically the acreage, condition, yield, and value of crops, including live stock, throughout the United States.

For the purpose of carrying out this work in an adequate manner the following plan is proposed: Reorganization of field force by discontinuance of State statistical agents and appointment of high-class young men of special training in agriculture as field agents in each State; also crop specialists to collect data and report upon special crops throughout the region of their growth; greater discrimination in selection of county and special crop reporters; expansion of work to include greater number of minor crops; greater utilization of charts and diagrams for showing deviation from normal of crop conditions and yields. It is also planned during the coming year to undertake the work for many years carried on by the National Association of Wool Growers in estimating the yearly production of wool in the United States.

*Cooperation.*—National, State, and local organizations.

*Location.*—Headquarters, Washington, D. C., with a field agent in each State and voluntary reporters in each county and township.

*Date begun.*—1863.

*Results.*—Accurate, unbiased, dependable reports and estimates of acreages planted, condition of growing crops at specified dates, yields and values, including number and value of live stock, widely published periodically.

*Assignment.*—S. A. Jones, E. Crane, field and office force, and crop reporting board.

*Proposed expenditures, 1914-15.*—\$156,216 (general expenses, \$119,076; statutory, \$37,140).

**Collecting and Reporting Agricultural Data:**

*Object.*—To collect, report, and tabulate data relating to various phases of agriculture, such as farm prices, occurrence and extent of plant and animal diseases, rural organizations, special crops or classes of farm animals not included in regular schedules.

*Cooperation.*—Other bureaus, offices, and divisions of the department.

*Location.*—Office force, Washington, D. C., and field force throughout the United States.

*Date begun.*—1863.

*Results.*—Fairly complete and accurate data regarding different phases of agricultural industry have been made available for publication or for the use of investigators and specialists in other bureaus of the department.

*Assignment.*—S. A. Jones, E. Crane, and F. J. Blair.

*Proposed expenditures, 1914-15.*—\$31,520 (general expenses, \$22,020; statutory, \$9,500).

**Collecting and Reporting Foreign Crop Data:**

*Object.*—To exchange crop estimates with the International Institute of Agriculture at Rome. It is planned during the present year to install a system of estimating the "visible stocks of grain" in the United States, for transmission to the International Institute of Agriculture at Rome.

*Cooperation.*—International Institute of Agriculture at Rome.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—The bureau has furnished crop estimates in the United States to the International Institute of Agriculture at Rome since 1909, and has received in exchange therefor the published crop estimates compiled by the institute for all foreign countries reporting thereto, thereby supplementing the crop estimates of the United States with estimates of the same crops in nearly all foreign countries.

*Assignment.*—Leon M. Estabrook.

*Proposed expenditures, 1914-15.*—\$4,000 (statutory).

**Total, Crop Reporting,** \$191,736 (general expenses, \$141,096; statutory, \$50,640).

## CROP ESTIMATING.

**Estimating the Acreage, Yield, and Value of Domestic and Foreign Crops:**

*Object.*—To furnish annual estimates of the acreage, yield, and value of the agricultural production of the United States and of foreign countries included in the annual estimates of the International Institute of Agriculture at Rome.

*Cooperation.*—National, State, and local organizations, the International Institute of Agriculture at Rome, and other foreign agencies.

*Location.*—Washington, D. C.

*Date begun.*—1866.

*Results.*—The publication annually in the Yearbook of the department, and at more frequent intervals by means of tabular statements and correspondence, of preliminary and final estimates of agricultural production in the United States and in foreign countries, thereby making such data for a long series of years available for study, comparison, and analysis.

*Assignment.*—Frank Andrews, George K. Holmes, and Charles M. Daugherty.

*Proposed expenditures, 1914-15.*—\$28,460 (general expenses, \$6,015; statutory, \$22,445).

**Estimates of the International Trade of the United States in Agricultural Products:**

*Object.*—To furnish annual estimates of the international trade of the United States in agricultural products (comprising imports and exports of farm and forest products).

*Cooperation.*—Department of Commerce.

*Location.*—Washington, D. C.

*Date begun.*—1863.

*Results.*—The publication annually in the Yearbook of the Department of Agriculture, and at more frequent intervals by means of tabular statements and correspondence, of estimates of imports and exports of farm and forest products, indicating the surplus or deficiency of agricultural production in the United States and foreign countries having a surplus or deficiency of production, embracing comparative data as far back as 1790.

*Assignment.*—Frank Andrews and assistants.

*Proposed expenditures, 1914-15.*—\$8,000 (general expenses, \$1,691; statutory, \$6,309).

**Estimates of Planting and Harvesting Dates of Principal Crops:**

*Object.*—To estimate the dates of seeding and harvesting (estimated average dates of planting and harvesting of each of the principal crops in the United States).

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Average dates of seeding and harvesting cereal crops, flax, cotton, and tobacco, published in Bureau of Statistics Bulletin 85. Manuscripts of similar data by States covering forage crops and crimson clover have been prepared and are available for publication. It is planned to complete and publish the compilation of data already begun relative to seeding and harvesting corn, potatoes, and wheat, and to extend this work to a greater number and variety of crops.

*Assignment.*—Frank Andrews and James R. Covert.

*Proposed expenditures, 1914-15.*—\$1,100 (general expenses, \$100; statutory, \$1,000).

**Estimates of Prices of Farm Products and Articles Bought by Farmers:**

*Object.*—To make annual estimates of prices received by farmers for their products and prices of principal articles bought by them.

*Cooperation.*—Office of Markets.

*Location.*—Washington, D. C.

*Date begun.*—1866.

*Results.*—Compilation of prices of farm products and of articles purchased by farmers published periodically in publications of the department.

*Assignment.*—Nat C. Murray, E. Crane, and assistants.

*Proposed expenditures, 1914-15.*—\$12,000 (general expenses, \$2,115; statutory, \$9,885).

**Chronology of Agriculture:**

*Object.*—To compile a history of growth of production of principal crops in the United States from beginning of industries (a series of important events in American agriculture).

*Cooperation.*—Rural Organization Service.

*Location.*—Washington, D. C.

*Date begun.*—1909.

*Results.*—Data not yet ready for publication.

*Assignment.*—George K. Holmes.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Estimate of Meat Supply in the United States and Foreign Countries:**

*Object.*—To determine the number of meat animals on hand, and the United States exports and imports of meat animals and their products, including investigation into the general conditions affecting the meat supply.

*Cooperation.*—Bureau of Animal Industry and Office of Markets.

*Location.*—Washington, D. C.

*Date begun.*—1914.

*Results.*—Data not yet ready for publication.

*Probable date of completion.*—January 1, 1915.

*Assignment.*—L. M. Estabrook, Frank Andrews, and George K. Holmes.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses, \$317; statutory, \$1,183).

**Estimate of Wages of Farm Labor:**

*Object.*—To make annual estimates of wages paid for labor in different types of farming in different localities, with and without board, by day, month, or year, as an incident to cost of production.

*Location.*—Washington, D. C.

*Date begun.*—1866.

*Results.*—Publication in Agricultural Outlook of annual estimates of wages.

*Assignment.*—Nat C. Murray, E. Crane, and assistants.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses, \$422; statutory, \$1,578).

**Growth of Dairy Industry in the United States:**

*Object.*—To make an estimate of the growth of city demand for milk, of butter and cheese manufactured, of relation of dairy cows to improved land area, etc.

*Cooperation.*—Office of Markets and Dairy Division.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Results.*—Data not yet ready for publication.

*Probable date of completion.*—October, 1914.

*Assignment.*—Frank Andrews.

*Proposed expenditures, 1914-15.*—\$600 (general expenses).

**Total, Crop Estimating,** \$55,160 (general expenses, \$12,760; statutory, \$42,400).

**OFFICE OF EXPERIMENT STATIONS.****RELATIONS WITH AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.****Relations with Agricultural Colleges and Experiment Stations:**

*Object.*—(1) To enforce the provisions of an act approved July 2, 1862, and acts supplementary thereto; of an act approved March 16, 1906; and of an act approved May 8, 1914; and to enable the Secretary of Agriculture to certify to the Treasury Department whether or not Federal funds may properly be advanced to the various experiment stations and colleges, and to report to Congress regarding the work and expenditures of these institutions. This includes the supervision and annual inspection of the work and expenditures of State and Territorial experiment stations and of the cooperative agricultural extension work between the State agricultural colleges and the Department of Agriculture. (2) To furnish prompt information regarding investigations made by experiment stations, colleges, and kindred institutions to workers in similar lines in this department and the agricultural colleges and schools, the information being published monthly in the Experiment Station Record.

*Location.*—Washington, D. C.

*Date begun.*—1889.

*Assignment.*—A. C. True.

*Proposed expenditures, 1914-15.*—\$86,213.33 (general expenses, \$50,500; statutory, \$35,713.33).

## ALASKA EXPERIMENT STATION.

## Alaska Experiment Station:

*Object.*—To determine the agricultural possibilities in Alaska and to investigate problems underlying the development of agriculture in that Territory. It is planned to make an agricultural survey of the possibility of the valleys of the Susitna and Matanuska Rivers and the location and establishment of an agricultural experiment station to the north of Cook Inlet, provided that region is to be traversed by the contemplated Government railroad.

*Location.*—Sitka, Rampart, Kodiak, and Fairbanks, Alaska.

*Date begun.*—1898.

*Results.*—Investigations with agricultural and horticultural plants have shown what crops and varieties can be safely recommended for different localities; plant-breeding experiments in hybridizing and selection have developed varieties of strawberries hardier and better than any hitherto known, barley hybrids that surpass all others in earliness, stiffness of straw, yields, etc., and strains of other cereals, potatoes, and vegetables better suited to the country than those commonly known; studies in soil management have shown definitely some of the agricultural problems of the country; and animal breeding work has shown the possibility and practicability of raising Galloway cattle and sheep along the coast region where dependence is solely on pastures, hay, and silage.

*Assignment.*—C. C. Georgeson.

*Proposed expenditures, 1914-15.*—\$40,000 (general expenses).

## HAWAII EXPERIMENT STATION.

## Hawaii Experiment Station:

*Object.*—To investigate problems underlying the development of agriculture in Hawaii and to devise means and methods of improving the art and practice. The work will include demonstrations to farmers and communities on the different islands composing the group in growing, handling, and marketing tropical and subtropical crops, such as pineapples, bananas, cotton, roselle, corn, potatoes, onions, garden vegetables, etc., and in stock raising, dairying, etc.

*Cooperation.*—A limited amount with individuals.

*Location.*—Hawaiian Islands.

*Date begun.*—1901.

*Results.*—The work has aided materially in solving problems tending toward diversification of agriculture; studies on the management of soils for rice and pineapples have resulted in the adoption of methods of great practical value; plant-breeding experiments have provided improved varieties of rice, various tropical fruits, and ornamentals; the introduction of a number of valuable varieties of forage crops has greatly improved the stock ranges of the island; the life history of a considerable number of insect pests and methods of their control have been worked out; and a number of new agricultural industries, such as cotton growing, tobacco culture, utilization of algaroba beans for feeding stock, production of kukui-nut oil, cooperative dairying, etc., have been fostered.

*Assignment.*—E. V. Wilcox.

*Proposed expenditures, 1914-15.*—\$35,000 (general expenses).

## PORTO RICO EXPERIMENT STATION.

## Porto Rico Experiment Station:

*Object.*—To investigate problems underlying the development of agriculture in Porto Rico and to devise means and methods of improving the art and practice.

*Cooperation.*—A limited amount with individuals.

*Location.*—Mayaguez, Porto Rico.

*Date begun.*—1901.

*Results.*—The proper methods for handling some of the soils peculiar to the island have been determined; improved coffees have been developed; experiments in the care and feeding of stock have resulted in great improvement in the live stock of the island; methods for the control of various fungous and insect pests have been determined, and the station has contributed materially to the development of the citrus-fruit and pineapple industries. The bee-keeping industry owes its inception entirely to the entomological work of the station.

*Assignment.*—D. W. May.

*Proposed expenditures, 1914-15.*—\$30,000 (general expenses).

### GUAM EXPERIMENT STATION.

#### Guam Experiment Station:

*Object.*—To determine the agricultural possibilities in Guam.

*Location.*—Guam, Ladrone Islands.

*Date begun.*—1909.

*Results.*—The introduction of new varieties of tropical forage plants has demonstrated that forage production on the island, sufficient for stock raising, is possible; better varieties of fruits and vegetables have been secured and distributed; the introduction of pure-bred Morgan horses, Ayrshire cattle, Berkshire hogs, and Plymouth Rock and Brown Leghorn chickens with a view to improving the live stock of the island promises to be of great value; investigations of the diseases of domestic animals promise gratifying results.

*Assignment.*—A. C. Hartenbower.

*Proposed expenditures, 1914-15.*—\$15,000 (general expenses).

### FARMERS' INSTITUTES AND AGRICULTURAL SCHOOLS.

#### Supervision:

*Object.*—General supervision of the investigations of farmers' institutes and agricultural schools.

*Location.*—Washington, D. C.

*Assignment.*—A. C. True.

*Proposed expenditures, 1914-15.*—\$2,000 (general expenses, including \$850 unallotted reserve).

#### Farmers' Institutes:

*Object.*—To investigate and report upon the organization and progress of farmers' institutes in the United States and foreign countries.

*Cooperation.*—State officials and institutions.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—Material aid has been rendered the widespread movement for the vocational education of the masses of rural people through the systematic collection and dissemination of information regarding the status and progress of farmers' institutes and other organizations for the instruction of farm men and women throughout the world, through conferences with State and local officials having such work in charge, addresses at representative gatherings of farmers and agricultural educators, and publications making definite suggestions for the better organization and work of agencies for these purposes.

*Assignment.*—J. M. Stedman.

*Proposed expenditures, 1914-15.*—\$11,380 (general expenses, \$9,000; statutory, \$2,380).

#### Agricultural Schools:

*Object.*—To investigate and report upon the organization and progress of agricultural schools in the United States and foreign countries.

*Cooperation.*—State institutions.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—The Office of Experiment Stations has materially aided the movement for agricultural education in the United States through the collection and dissemination of information regarding the status and progress of agricultural education at home and abroad; suggestions for courses of study and the organization of agricultural schools of different kinds and grades; and active propaganda by means of publications, addresses, and conferences.

*Assignment.*—C. H. Lane.

*Proposed expenditures, 1914-15.*—\$16,106.67 (general expenses, \$12,000; statutory, \$4,106.67).

**Total, Farmers' Institutes and Agricultural Schools,** \$29,486.67 (general expenses, \$23,000; statutory, \$6,486.67).

### HOME ECONOMICS INVESTIGATIONS.

#### Supervision:

*Object.*—General supervision of the investigations of the relative utility and economy of agricultural products for food, etc., including necessary clerical and other routine work.

*Location.*—Washington, D. C.

*Assignment.*—A. C. True.

*Proposed expenditures, 1914-15.*—\$1,680 (nutrition investigations, \$1,200; statutory, \$480).

**Investigations:**

*Object.*—To investigate the relative utility and economy of agricultural products for food, clothing, and other uses in the home, for the purpose of suggesting plans and methods for the more effective utilization of such products for these purposes. These investigations involve respiration calorimeter experiments on the incubation of eggs and studies of labor expenditure and efficiency in household activities; studies of effective sterilization temperatures in cooking animal food, and of the utility, economy, and use of agricultural materials employed for clothing and other home purposes; studies of the more effective utilization of clothing and of home equipment; and respiration calorimeter experiments in the ripening of fruits and vegetables.

*Cooperation.*—Bureaus of Chemistry, Plant Industry, and Animal Industry.

*Location.*—Washington, D. C.

*Date begun.*—1895.

*Results.*—Apparatus and methods of inquiry which have proved preeminently successful in investigations on the food and nutrition of man have been developed, the results obtained forming very important contributions to knowledge of the doctrine of nutrition. The large amount of accumulated information is already incorporated in textbooks on physiology and dietetics that are being used in schools, colleges, and elsewhere, and also find wide application by housekeepers, managers of institutions, physicians, and others interested in the feeding of man either as an individual or in groups.

*Assignment.*—C. F. Langworthy, R. D. Milner.

*Proposed expenditures, 1914-15.*—\$29,580 (nutrition investigations, \$24,560; statutory, \$5,020).

**Total, Home Economics Investigations,** \$31,260 (nutrition investigations, \$25,760; statutory, \$5,500).

**IRRIGATION INVESTIGATIONS.****Supervision:**

*Object.*—Supervision of irrigation investigations, including necessary clerical and other routine work, and purchase of supplies and equipment not chargeable elsewhere.

*Location.*—Washington, D. C.

*Date begun.*—1899.

*Assignment.*—A. C. True, Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$21,886.67 (irrigation investigations, including \$2,400 unallotted reserve, \$25,400; statutory, \$6,846.67).

**Use of Water:**

*Object.*—To determine what constitutes the best use of water in irrigation, both as to quantity used and time of application, with different crops under different soil and climatic conditions; and to determine the advantages and possibilities of irrigation. The work in progress is fundamental and will be continued and extended, as correct standards for the use of water are necessary to the best irrigation practice. Experiments have not yet developed all the facts needed and these will be continued until the principles governing the quantity of water required and the time when it is needed are well understood.

*Cooperation.*—With State experiment stations, institutions, communities, and individuals.

*Location.*—Throughout continental United States.

*Date begun.*—1899.

*Results.*—A large amount of data as to the best quantity of water to use and the best time of applying it has been accumulated and disseminated in bulletins of the department and publications of cooperators. The effect has been to show that irrigators generally use too much water and to induce a more economical use. Speaking generally, the supply of water for irrigation is limited, and anything leading to a more economical use results in increasing the available supply of water. In the East and South demonstration of the possibilities of irrigation is causing rapid extension of the practice.

*Assignment.*—Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$39,500 (irrigation investigations, \$39,000; statutory, \$500).

**Irrigation Practice:**

*Object.*—To ascertain the best methods and means of supplying the water requirements of crops as determined by studies under the project, "Use of Water;" to adapt methods of applying water to varying conditions of crops and soils; and to make available for all sections the improvements in irrigation practice

**Irrigation Practice—Continued.**

worked out in other sections. The drought of 1913 in the East and Middle West brought under irrigation large areas under new conditions requiring new methods. In many older sections prevailing methods are wasteful and investigations are necessary to work out improvements in practice. The failure to adapt practice to physical conditions is one of the most common causes of waste of time and water, and often of failure in irrigation farming, and this work is for the purpose of relieving this waste and loss.

*Cooperation.*—State experiment stations, institutions, communities, and individuals.

*Location.*—Throughout continental United States (see also "Results").

*Date begun.*—1899.

*Results.*—The results of this work are made available through personal advice, correspondence, publications, and the maintenance of stations which serve the double purpose of experiment and demonstration. Such stations are maintained in cooperation with local agencies at Higley, Ariz.; Davis, Cal.; Gooding, Idaho; Garden City, Kans.; and Cheyenne and Newcastle, Wyo.

*Assignment.*—Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$14,300 (irrigation investigations, \$14,200; statutory, \$100).

**Power and Appliances:**

*Object.*—Investigations and experiments in the use of engines and pumps of various types for supplying water for irrigation; in the design and construction of dams, canals, canal structures, canal linings, measuring devices, gates, etc.; and in the construction and use of implements and equipment for use in preparing land for irrigation, construction of farm ditches, and applying water to land; for the purpose of determining types of machinery and structures best suited for the purpose which they are to serve, and to provide data for use in preparing publications and answering inquiries. A large part of the semiarid region has no source of water for irrigation except underground supplies, most of which must be raised to the surface by pumping. Experiments will be made with a view to adapting pumps and motors to this work and information will be collected as to cost of wells and pumping equipment. In many parts of the arid region extension of present irrigated areas will depend largely upon pumping from underground sources, and determination of possibilities of this type of development is most important.

*Cooperation.*—State experiment stations and institutions.

*Location.*—Throughout continental United States.

*Date begun.*—1899.

*Results.*—A report on gate structures has been prepared and is now in press (Dept. Bul. 115); reports on pumping for irrigation in course of preparation; report on canal linings prepared and submitted for publication; technical and popular reports on experiments in calibration of measuring devices prepared and submitted for publication; results of measurements of canals and other conduits to determine values of friction factors in hydraulic formulæ in course of preparation. A large amount of the accumulated information regarding pumping water for irrigation is in constant use in advising farmers as to possibilities of pumping water for irrigation and as to equipment needed.

*Assignment.*—Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$22,500 (irrigation investigations, \$22,200; statutory, \$300).

**Laws and Institutions:**

*Object.*—Studies of the laws, forms of organization, regulations, systems of distribution, etc., affecting the use of water for irrigation, to determine the effect of these laws and institutions on the utilization of the water resources of the country, upon the equitable distribution of water and its economical use, and upon the settlement and utilization of lands under irrigation enterprises, and to suggest such changes as seem to be needed. At the present time in many sections economic difficulties outweigh the scientific and technical questions connected with irrigation. The most recently organized irrigation enterprises have been financial failures, and studies will be made to determine the underlying causes. Settlers on new irrigation enterprises are not succeeding, and studies will be made to determine in what measure this is due to the system of organization or operation of the enterprises. The laws of the arid States relating to irrigation differ materially, and studies will be made with a view to securing greater uniformity and better adaptation to the needs of agriculture under irrigation.

**Laws and Institutions—Continued.**

*Cooperation.*—State institutions and officials.

*Location.*—Throughout continental United States.

*Date begun.*—1899.

*Results.*—In the earlier years of the work several bulletins along these lines were published, since which time most of the arid States have modified their laws or adopted new codes. The rapid extension of the area under ditch and difficulties in bringing this area into successful cultivation and securing capital for new development have raised many questions regarding forms of organization, systems of management, and regulations. A large amount of information in relation to these matters has been collected and will be prepared for publication and other uses.

*Assignment.*—Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$7,600 (irrigation investigations, \$7,500; statutory, \$100).

**Advisory Service:**

*Object.*—To supply to the public information on the possibilities of irrigation, and in regard to irrigation equipment, methods, legislation, organization, etc., by maintaining irrigation experiment stations (which serve also as demonstrations) and through oral and written advice to individuals and communities requesting such assistance. The drought of 1913 throughout the semiarid and humid regions has greatly increased the demand for such information and advice.

*Location.*—Throughout continental United States.

*Date begun.*—1899.

*Results.*—The work has resulted in the improvement of irrigation practice; the protection of individuals from loss by preventing the purchase and installation of equipment not suited to their needs; and by forestalling attempts to use methods not adapted to their conditions; and in general tends to put to use the results of the work of the division.

*Assignment.*—Samuel Fortier.

*Proposed expenditures, 1914-15.*—\$10,000 (irrigation investigations, \$8,100; statutory, \$1,900).

**Total, Irrigation Investigations, \$115,786.67** (irrigation investigations, \$106,400; statutory, \$9,386.67).

**DRAINAGE INVESTIGATIONS.****Supervision:**

*Object.*—Supervision of drainage investigations, including necessary clerical and other routine work, and purchase of supplies and equipment not chargeable elsewhere.

*Location.*—Washington, D. C.

*Date begun.*—1903.

*Assignment.*—A. C. True, S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$23,183.33 (drainage investigations, including \$2,280, unallotted reserve, \$16,280; statutory, \$6,903.33).

**Farm Drainage:**

*Object.*—Drainage investigations, surveys, and preparation of plans for the drainage of selected areas to serve as demonstrations of the benefits resulting from the installation of properly constructed farm drains, and as object lessons to interested landowners of the best methods of planning and constructing such drains.

*Cooperation.*—North Carolina Department of Agriculture, Alabama Agricultural Experiment Station, and representative farmers and interested landowners.

*Location.*—Middle and South Atlantic States and lower Mississippi Valley, and particularly in Maryland, North Carolina, South Carolina, Georgia, Alabama, and Arkansas.

*Date begun.*—1903.

*Results.*—A considerable number of tile drainage systems have been installed by landowners and have served to demonstrate methods of work that are both economical and efficient. The greatest interest has been manifested in cooperative work in these sections and the increased production and ease in cultivation on drained land as compared with undrained adjacent fields have become effective demonstrations of the value of drainage. Addresses at farmers' institutes and among agricultural workers have been instrumental in extending the knowledge of the benefits of farm drainage.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$9,300 (drainage investigations, \$9,000; statutory, \$300).

**Overflowed Lands:**

*Object.*—To promote interest in the reclamation of overflowed lands so that they may be made available for agricultural purposes.

*Cooperation.*—State drainage districts, communities, and individuals.

*Location.*—Kentucky, Arkansas, Georgia, Alabama, Maryland, Virginia, and Mississippi.

*Date begun.*—1903.

*Results.*—Plans for reclamation based on drainage surveys have been prepared for overflowed lands in Union and Henderson Counties, Ky.; drainage surveys have been made in Appling and Banks Counties, Ga., and Lafayette County, Ark., for which plans and cost estimates for reclamation are in course of preparation. A large number of districts have been examined for the purpose of suggesting kind of work needed and outlining methods for determining details of reclamation plans and estimating costs. Plans prepared and submitted by drainage district engineers have been examined and accuracy determined. The principal activities have been in the lower Mississippi Valley and in the Piedmont section of the South Atlantic States.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$21,500 (drainage investigations, \$20,000; statutory, \$1,500).

**Swamp Lands:**

*Object.*—To promote interest in the reclamation of swamp lands so that they may be made available for agricultural purposes.

*Cooperation.*—State drainage districts, communities, and individuals.

*Location.*—Georgia, Florida, North Carolina, South Carolina, specifically, and the Middle and South Atlantic States in general.

*Date begun.*—1903.

*Results.*—Preparation of plans based on drainage surveys for systems of main drains for areas of swamp land located in the Middle and South Atlantic States and inspection of injured areas, with brief reports of the nature and extent of work necessary in reclamation, have resulted in the formation under State laws of many drainage districts, and much construction work is now under way. This is especially marked in Georgia and the Carolinas.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$10,500 (drainage investigations, \$10,000; statutory, \$500).

**Drainage of Irrigated Lands:**

*Object.*—To determine best methods of reclaiming lands injured by seepage and accumulations of alkali and to advise interested landowners in these matters. Special attention will be given to work at Kearney Park Experiment Station, Cal., where an experimental tile-drainage system has been installed; to work in the Grand Valley of Colorado; to a study of the results of drainage in the Yakima Valley, Wash.; and to seepage problems in the vicinity of Twin Falls, Idaho. Plans for investigations in Oregon and Montana are being formulated. In conjunction with line of test wells placed across the Pecos Valley, studies of the movement and fluctuations of ground water will be made.

*Cooperation.*—State institutions, drainage districts, communities, and individual landowners.

*Location.*—Utah, Colorado, Washington, Idaho, California, New Mexico, Arizona, Texas, and possibly Oregon and Montana.

*Date begun.*—1903.

*Results.*—Examinations and drainage surveys have been made and plans prepared for the relief of these lands and some experimental drainage systems installed in Colorado and Idaho. On a barren tract badly spotted with alkali an experimental underdrain has shown improvements so marked that early and complete reclamation seems assured. In the Yakima Valley, Wash., drainage districts have undertaken construction in accordance with recommendations of this department and satisfactory results are promised. The preparation of a Farmers' Bulletin on the drainage of irrigated lands is practically accomplished. A map classifying lands in Pecos Valley with respect to their needs of drainage has been prepared. Weirs and gauges have been established at different points in several States and measurements of amounts of water discharged by drains are in progress.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$23,500 (drainage investigations, \$23,000; statutory, \$500).

**Tidal Marshes:**

*Object.*—To investigate special problems of embanking lands subject to tidal overflow, proper size and arrangement of sluice openings, and requisite storage capacity on ditches.

*Cooperation.*—California Agricultural Experiment Station.

*Location.*—California and Washington. (Tidal lands about San Francisco Bay and Puget Sound.)

*Date begun.*—1903.

*Results.*—Prior to this time pressure of other investigations has precluded continuous work in this line, but earlier results were published in Office of Experiment Station Bul. 240.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$1,050 (drainage investigations, \$1,000; statutory, \$50).

**Technical Investigations:**

*Object.*—To secure data for use by the department in preparing suggestions and plans for drainage improvements and for dissemination to engineers and others interested in the reclamation of swamp, overflowed, and water-logged lands.

*Cooperation.*—Bureau of Standards, Department of Commerce, and individual tile manufacturers.

*Location.*—Throughout continental United States.

*Date begun.*—1903.

*Results.*—Valuable data have been obtained of flood discharge of private ditches and of natural streams in Mississippi, Missouri, Louisiana, North Carolina, Texas, and Georgia, and these have been put in shape for dissemination. A department bulletin (No. 71) has been published on the "Reclamation of Wet Lands of Southern Louisiana," dealing especially with the economic capacity of pumping plants. Drainage laws in a number of States have been enacted or amended, the department engineers furnishing suggestions for amendments and assisting in the preparation of new laws. Reports are in progress upon types of trenching machinery suitable for tile-drainage work and excavators for larger work, including cost data of various types of machinery suitable for different conditions of work. Experimental installations have been made in cooperation with the Bureau of Standards, Department of Commerce, of concrete tile in various alkaline soils of the arid regions for the purpose of observing the effect of the salts and of frost upon this class of tile.

*Assignment.*—S. H. McCrory.

*Proposed expenditures, 1914-15.*—\$19,000 (drainage investigations, \$17,000; statutory, \$2,000).

**Total, Drainage Investigations,** \$108,033.33 (drainage investigations, \$96,280; statutory, \$11,753.33).

**OFFICE OF PUBLIC ROADS.****GENERAL ADMINISTRATION.****General Administration:**

*Object.*—To administer the investigational activities of the office; carry on its business affairs, correspondence, accounting, etc.

*Location.*—Washington, D. C.

*Date begun.*—1893.

*Assignment.*—L. W. Page, P. St. J. Wilson, and W. C. Wyatt.

*Proposed expenditures, 1914-15.*—\$31,300 (general expenses, \$14,000; statutory, \$17,300).

**ROAD-MANAGEMENT INVESTIGATIONS.****General Statistical and Research Investigations:**

*Object.*—To determine and systematize all available information and statistics relative to highways, including maintenance of current record, completion of compilation of road laws, and suggestions for revision; complete statistics on mileage, expenditures, costs, and bond issues.

*Cooperation.*—Highway officials and others.

*Location.*—Washington, D. C.

*Date begun.*—1905.

**General Statistical and Research Investigations—Continued.**

*Results.*—Census of road mileage, revenues and expenditures for 1904 completed and published; similar census for 1909 completed and published; preparations under way for 1914 census; compilation of all road laws about two-thirds completed; routine reports received monthly from State collaborators.

*Probable date of completion.*—Continuous, except road law compilation, to be completed September 30, 1914, and mileage and expenditure census, to be completed about January 1, 1916.

*Assignment.*—J. E. Pennybacker, M. O. Eldridge, L. E. Boykin, A. P. Anderson.  
*Proposed expenditures, 1914-15.*—\$19,543 (general expenses, \$12,430; statutory, \$7,113).

**Road Management—Convict Labor Studies:**

*Object.*—To determine the feasibility and desirability of using convicts on road work and preparing road material.

*Cooperation.*—Department of Labor, State prison commissions, and State highway departments.

*Location.*—All sections of country.

*Date begun.*—June, 1914.

*Results.*—Preliminary correspondence and preparation of outline.

*Probable date of completion.*—July 1, 1915.

*Assignment.*—J. E. Pennybacker, Jos. Hyde Pratt.

*Proposed expenditures, 1914-15.*—\$2,640 (general expenses, \$2,100; statutory, \$540).

**Economic Study of Highway Systems:**

*Object.*—To determine the relative efficiency of systems of management, the economic and social effects of highway improvement on the welfare of rural communities, and its economic effect on rural delivery and parcel post.

*Cooperation.*—State highway departments; Post Office Department.

*Location.*—Study of highway systems of management in 100 to 200 selected counties, representing all States; economic studies completed in Virginia, Florida, Alabama, Mississippi, New York, and Vermont; various post roads constructed partially at expense of Federal Government.

*Date begun.*—1909.

*Results.*—Systems of management studied in 10 counties and preparations made for additional studies; economic county studies now completed and are being compiled; first economic studies of post roads completed in 14 States and second studies in 2 States.

*Probable date of completion.*—Field studies, July 1, 1915; economic studies, January 1, 1915.

*Assignment.*—J. E. Pennybacker, A. S. Brainard, Geo. D. Marshall, O. W. Childs, J. J. Tobin, C. H. Kendall, W. E. Rosengarten.

*Proposed expenditures, 1914-15.*—\$19,140 (general expenses, \$16,540; statutory, \$2,600).

**Traffic Census:**

*Object.*—To determine wear and service of highways and cost of maintenance of various road surfaces under known traffic; also to determine the kind and type of road to be built.

*Location.*—Chevy Chase and Rockville, Md., and on following post roads: Lauderdale County, Ala.; Boone, Story, and Dubuque Counties, Iowa; Montgomery and Bath Counties, Ky.; Cumberland County, Me.; Montgomery County, Md.; Leflore and Carroll Counties, Miss.; Muskingum and Licking Counties, Ohio; Jackson County, Oreg.; Loudon and Montgomery Counties, Tenn.; Dinwiddie, Spotsylvania, Hanover, and Fairfax Counties, Va.; Davie and McDowell Counties, N. C.; Aiken County, S. C.

*Date begun.*—1912.

*Results.*—Second year's census of traffic on Chevy Chase experimental road has been completed, and similar work is also under way on Rockville experimental road. Census is taken every thirteenth day for purpose of determining effect on roads. A complete year's traffic record has been taken on the following post roads: Lauderdale County, Ala.; Boone and Story Counties, Iowa; Cumberland County, Me.; Leflore and Carroll Counties, Miss.—the traffic records on the other post roads being in process of completion.

*Assignment.*—J. E. Pennybacker and assistants.

*Proposed expenditures, 1914-15.*—\$4,690 (general expenses, \$3,790; statutory, \$900).

**Lectures and Demonstration of Road and Bridge Models:**

*Object.*—To provide expert advice on the subject of highways.

*Cooperation.*—Organizations throughout the country, and expositions.

*Location.*—United States.

*Date begun.*—Lectures since establishment of office (1893); models since 1909.

*Results.*—Dissemination of a great deal of information of practical educational value by lectures, extending over a long period of years and by exhibit of road models in all parts of country.

*Assignment.*—J. E. Pennacker, M. O. Eldridge, L. E. Boykin, Geo. D. Marshall.

*Proposed expenditures, 1914-15.*—\$13,327 (general expenses, \$9,540; statutory, \$3,787).

**Instruction of Students in Highway Engineering:**

*Object.*—To instruct civil-engineer students in the economic and administrative phases of highway engineering, with a view to their practical training for highway work and to meet the demand for capable highway engineers.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Assignment.*—J. E. Pennacker and assistants.

*Proposed expenditures, 1914-15.*—\$400 (general expenses).

**Total, Road-Management Investigations,** \$60,080 (general expenses, \$44,800; statutory, \$15,280).

**ROAD BUILDING AND MAINTENANCE INVESTIGATIONS.****Object-Lesson Roads:**

*Object.*—To demonstrate proper methods of construction, proper use of materials; instruct local officials and United States engineer students in the art of road building; and correlate conclusions drawn from laboratory tests with those drawn from service tests.

*Cooperation.*—Township and county authorities in legal control of the roads.

*Location.*—Any political unit in the United States, excepting incorporated towns and cities, which makes proper application and agrees to our terms of cooperation.

*Date begun.*—1904.

*Results.*—Information secured and disseminated as to the best methods of road construction; improved methods of construction adopted by the various localities in which these roads have been built.

*Assignment.*—Vernon M. Peirce.

*Proposed expenditures, 1914-15.*—\$25,440 (general expenses, \$23,500; statutory, \$1,940).

**County Model System:**

*Object.*—To study the roads of a county or other political subdivision and prepare general plans and specifications for their improvement, maintenance, and administration.

*Cooperation.*—Township and county authorities in legal control of the roads. The Office of Public Roads furnishes a consulting engineer to cooperate with the local officials.

*Location.*—Any county or political subdivision of similar size and importance which makes proper application and agrees to our terms of cooperation.

*Date begun.*—1907.

*Results.*—Many counties have adopted our recommendations and are working along definite organized lines as to the ultimate system of roads that will be built, methods of construction, and administration.

*Assignment.*—Vernon M. Peirce.

*Proposed expenditures, 1914-15.*—\$8,140 (general expenses, \$7,000; statutory, \$1,140).

**Advice and Inspection:**

*Object.*—Study of specific road problems and preparation of specific recommendations for their solution.

*Cooperation.*—Township and county authorities in legal control of the roads. The Office of Public Roads furnishes a consulting engineer to cooperate with the local officials.

*Location.*—Any political unit in the United States, excepting incorporated towns and cities, which makes proper application and agrees to our terms of cooperation.

**Advice and Inspection—Continued.***Date begun.*—1894.*Results.*—Many communities unable to employ skilled highway engineers have been advised how to solve their road problems.*Assignment.*—Vernon M. Peirce.*Proposed expenditures, 1914-15.*—\$16,000 (general expenses, \$15,000; statutory, \$1,000).**Superintendence of County Roads:***Object.*—To demonstrate to county officials the advantages accruing from the supervision of all county roads by one skilled in highway construction and maintenance and the advantages of centralized control over all roads.*Cooperation.*—County officials in legal control of the roads.*Location.*—Any county which makes proper application and agrees to our terms of cooperation.*Date begun.*—1911.*Results.*—The roads in Bennington and Rutland Counties, Vt., were in charge of engineers from this office for two years and were much improved, and the county officials were convinced of the advantages of centralized control in the hands of qualified men and adopted this system and elected county highway engineers.*Assignment.*—Vernon M. Peirce.*Proposed expenditures, 1914-15.*—\$8,500 (general expenses, \$7,500; statutory, \$1,000).**Road Surveys:***Object.*—To point out to township and county officials the value of well-prepared plans, estimates, etc., and to instruct civil engineer students.*Cooperation.*—Township and county authorities in legal control of the roads.*Location.*—Any political unit in the United States, excepting incorporated towns and cities, which makes proper application and agrees to our terms of cooperation.*Date begun.*—1904.*Results.*—Civil engineer students have been instructed as to proper methods of survey, and local officials have been supplied with plans for road improvement and convinced of the desirability of definite plans.*Assignment.*—Vernon M. Peirce.*Proposed expenditures, 1914-15.*—\$6,080 (general expenses, \$5,000; statutory, \$1,080).**Instruction of Students in Highway Engineering:***Object.*—To give graduate civil engineers a course in highway engineering such as will well qualify them to take actual charge of highway work.*Location.*—Washington, D. C., and on the object lesson, experimental and post roads in the various States.*Date begun.*—1904.*Results.*—Graduate students in civil engineering have been instructed in the art of road building and are now in the employ of the United States and various States and counties.*Assignment.*—Vernon M. Peirce.*Proposed expenditures, 1914-15.*—\$12,000 (general expenses).**Improvement of Roads in United States Forest Reserves—Advice and Supervision:***Object.*—To advise with the Forest Service as to the best methods of constructing and maintaining roads and to make surveys and supervise the construction of a system of roads through the various United States forest reserves.*Cooperation.*—Forest Service.*Location.*—United States forest reserves.*Date begun.*—1906.*Results.*—The supervisors of a number of forest reserves have been advised as to the best methods of locating, constructing and maintaining the roads in the reserves.*Assignment.*—T. Warren Allen.*Proposed expenditures, 1914-15.*—\$10,880 (general expenses, \$10,000; statutory, \$880).

**Improvement of Roads in National Parks—Advice and Supervision:**

*Object.*—To advise with national park officials as to the best methods of constructing and maintaining roads in the various national parks.

*Cooperation.*—Department of the Interior.

*Location.*—United States national parks.

*Date begun.*—March, 1914.

*Results.*—Too early to be reported.

*Assignment.*—T. Warren Allen.

*Proposed expenditures, 1914-15.*—\$5,440 (general expenses, \$5,000; statutory, \$440).

**Road Maintenance—Advice and Supervision:****(a) REPRESENTATIVE STATE SYSTEMS—**

*Object.*—To study details of systematic maintenance developed by State highway departments in representative States.

*Location.*—Studies soon to be made in New York, Massachusetts, and New Hampshire, and later in other States.

*Date begun.*—Work separately organized February 16, 1914; not yet begun.

*Assignment.*—E. W. James.

*Proposed expenditures, 1914-15.*—\$1,065 (general expenses, \$1,000; statutory, \$65).

**(b) REPRESENTATIVE COUNTY SYSTEMS—**

*Object.*—To study details of county maintenance in selected counties having improved roads.

*Location.*—Studies to be made in such counties as Hillsboro County, Fla.; Duval County, Fla.; Montgomery County, Ala.; Hinds County, Miss.; Allegheny County, Pa., etc.

*Date begun.*—February, 1914.

*Assignment.*—E. W. James.

*Proposed expenditures, 1914-15.*—\$1,065 (general expenses, \$1,000; statutory, \$65).

**(c) POST ROADS—**

*Object.*—To supervise the maintenance of all completed post-road projects.

*Cooperation.*—States, counties, and subdivisions.

*Location.*—See locations under project "Improvement of post roads."

*Date begun.*—July 1, 1914.

*Assignment.*—E. W. James.

*Proposed expenditures, 1914-15.*—\$1,600 (general expenses, \$1,500; statutory, \$100).

**(d) WASHINGTON-ATLANTA HIGHWAY—**

*Object.*—To supervise the maintenance of the Washington-Atlanta highway.

*Cooperation.*—Counties and subdivisions.

*Location.*—In 25 counties between Petersburg, Va., and Atlanta, Ga. Work to be extended northward from Petersburg, Va., toward Washington as rapidly as construction now in progress is completed and applications are made by counties concerned.

*Date begun.*—May 1, 1914.

*Results.*—Applications from 25 counties place 581.3 miles, with funds amounting to \$27,525, under supervision of the Office of Public Roads. Systematic maintenance is being organized as rapidly as field engineers can cover the territory involved.

*Assignment.*—E. W. James, D. H. Winslow, W. L. Spoon, G. C. Scales.

*Proposed expenditures, 1914-15.*—\$13,265 (general expenses, \$12,500; statutory, \$765).

**(e) COST DATA—**

*Object.*—To conduct experimental maintenance to secure accurate cost data for various types of roads.

*Cooperation.*—Counties; Bureau of Plant Industry.

*Location.*—Alexandria County, Va.; Montgomery County, Md.; and Department of Agriculture grounds, Washington, D. C.

*Date begun.*—1907; as a part of the road-maintenance project, February, 1914.

*Results.*—Accurate data secured of cost and improvement in methods of maintenance on dirt, gravel, and bituminous macadam roads. Reports have been published in O. P. R. Circulars 89, 90, 92, 94, 98, 99; progress report for 1913 in press, in O. P. R. Bulletin 48 and Department Bulletin 53. It is planned to continue and extend work to such post-road projects as are constructed of bituminous materials and to experiment with bituminous materials on sand-clay, gravel, shell, and marl.

*Assignment.*—E. W. James.

*Proposed expenditures, 1914-15.*—\$1,600 (general expenses, \$1,500; statutory, \$100).

**Road Maintenance—Advice and Supervision—Continued.****(f) ORGANIZED MAINTENANCE OF BOND-AIDED ROADS—**

*Object.*—To introduce organized maintenance in counties that issued bonds for road construction during 1912-13. It is planned to start field work in the spring of 1915.

*Cooperation.*—Counties.

*Location.*—Various counties.

*Date begun.*—Preliminary studies commenced March 2, 1914.

*Results.*—A list of 54 counties has been made up which have assented to cooperate.

From this list a selection will be made for actual maintenance operations.

*Assignment.*—E. W. James.

*Proposed expenditures, 1914-15.*—\$2,665 (general expenses, \$2,500; statutory, \$165).

**Improvement of Post Roads:**

*Object.*—To construct improved highways over which United States mail is carried for service tests by Post Office Department, pursuant to act of August, 1912; and to ascertain the economic value of such improvement to the community.

*Cooperation.*—Post Office Department, States, counties, and townships.

*Location.*—See table below.

*Date begun.*—See table below.

*Probable date of completion.*—See table which follows.

*Post roads in course of construction.*

| Location.   | Date begun.          | Probable date of completion. |
|---|----------------------|------------------------------|
| Lauderdale County, Ala.....                           | July, 1913.....      | July, 1914.                  |
| Boone and Story Counties, Iowa.....                   | do.....              | Do.                          |
| Dubuque County, Iowa.....                             | April, 1914.....     | December, 1914.              |
| Montgomery and Bath Counties, Ky.....                 | October, 1913.....   | November, 1914.              |
| Cumberland County, Me.....                            | February, 1914.....  | December, 1914.              |
| Montgomery County, Md.....                            | April, 1914.....     | August, 1914.                |
| Leflore County, Miss.....                             | August, 1913.....    | December, 1914.              |
| McDowell County, N. C.....                            | February, 1914.....  | May, 1915.                   |
| Muskingum and Licking Counties, Ohio.....             | August, 1913.....    | December, 1914.              |
| Jackson County, Oreg.....                             | September, 1913..... | October, 1914.               |
| Aiken County, S. C.....                               | June 12, 1914.....   | January, 1915.               |
| Loudon County, Tenn.....                              | February, 1914.....  | November, 1914.              |
| Montgomery County, Tenn.....                          | April, 1914.....     | December, 1914.              |
| Austin-San Antonio Road, Tex.....                     | June 15, 1914.....   | May, 1915.                   |
| Fairfax County, Va.....                               | November, 1913.....  | December, 1914.              |
| Spotsylvania, Caroline, and Hanover Counties, Va..... | October, 1913.....   | October, 1914.               |

*Assignment.*—Vernon M. Peirce.

*Proposed expenditures, 1914-15.*—\$43,200 (general expenses, \$40,000; statutory, \$3,200).

**Total, Road Building and Maintenance Investigations,** \$155,680 general expenses, \$145,000; statutory, \$10,680).

**ROAD-MATERIAL INVESTIGATIONS.****Chemical Testing of Road-Construction Materials.**

*Object.*—To conduct routine chemical tests and inspection of dust preventives and road binders and other materials used in road construction, determine their value, conformity with specifications, etc.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—About 1,500 samples tested; advice rendered and specifications furnished continually.

*Assignment.*—C. S. Reeve, F. P. Pritchard, B. A. Anderton, R. H. Lewis.

*Proposed expenditures, 1914-15.*—\$12,313 (general expenses, \$10,000; statutory, \$2,313).

**Microscopic Examination and Classification of Road-Building Rocks:**

*Object.*—Identification of road-building rocks and correlation of mineral composition with values of physical tests.

*Location.*—Washington, D. C.

*Date begun.*—1901.

**Microscopic Examination and Classification of Road-Building Rocks—Con.**

*Results.*—About 4,000 samples examined. Reports in Office of Public Roads Bulletins 31 and 37 and several technical papers.

*Assignment.*—E. C. E. Lord.

*Proposed expenditures, 1914-15.*—\$2,640 (general expenses, \$1,800; statutory, \$840).

**Investigation of the Properties of Dust Preventives and Road Binders:**

*Object.*—To develop new materials suitable for dust preventives and road binders and study the effect of constituents upon the value of the material. This work will include a study of the effect of exposure on bitumens, effect of rock powders on various bitumens, and of comparative binding values of different bitumens with various rocks.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Results.*—Reports in Office of Public Roads Bulletin 34, Office of Public Roads Circulars 93, 96, and 97, Yearbook articles (1907 and 1910), and papers before technical societies.

*Assignment.*—C. S. Reeve, B. A. Anderton, R. H. Lewis.

*Proposed expenditures, 1914-15.*—\$1,300 (general expenses).

**Standardization of Methods of Testing Bituminous Road Materials:**

*Object.*—The development of new tests where needed, and the unification of methods of testing.

*Cooperation.*—American Society for Testing Materials.

*Location.*—Washington, D. C.

*Date begun.*—1905.

*Results.*—Reports in Office of Public Roads Bulletin 38 and papers before American Society for Testing Materials, American Chemical Society, etc., including work on melting point and ductility test and work on paraffin scale determinations.

*Assignment.*—C. S. Reeve, F. P. Pritchard, R. H. Lewis.

*Proposed expenditures, 1914-15.*—\$1,800 (general expenses).

**Experimental Bituminous Road Construction and Maintenance:**

*Object.*—Developing new types of bituminous road construction and inspecting and maintaining previously constructed experimental roads.

*Location.*—Various localities throughout the United States. Current year's work in Dade and Palm Beach Counties, Fla.

*Date begun.*—1905.

*Results.*—Given in detail in Office of Public Roads Circulars 47, 89, 90, 92, 94, 98, 99, and Department Bulletin 105.

*Assignment.*—C. S. Reeve, B. A. Anderton.

*Proposed expenditures, 1914-15.*—\$1,500 (general expenses).

**Instruction of Students and Highway Engineers:**

*Object.*—To instruct students and highway engineers in the characteristics and methods of testing and using dust preventives and road binders and nonbituminous road material. Student engineer course takes place in January and February of each year. Highway engineers may take course any time during year.

*Location.*—Washington, D. C.

*Date begun.*—1904.

*Assignment.*—C. S. Reeve, F. P. Pritchard, B. A. Anderton, E. B. Smith.

*Proposed expenditures, 1914-15.*—\$1,000 (general expenses).

**Physical Testing of Road-Building Materials:**

*Object.*—To furnish information on road building value of materials by means of physical tests.

*Location.*—Washington, D. C.

*Date begun.*—Inception of office (1893) or before.

*Results.*—Several thousand samples tested and reports made to States, municipalities, corporations, and private individuals.

*Assignment.*—E. B. Smith, F. H. Jackson.

*Proposed expenditures, 1914-15.*—\$14,087 (general expenses, \$11,500; statutory, \$2,587).

**Concrete Investigations:**

*Object.*—To obtain information pertaining to concrete pavement and bridge construction.

*Location.*—Washington, D. C., and Chevy Chase, Md.

*Date begun.*—Prior to 1905.

**Concrete Investigations—Continued.**

*Results.*—Bulletins issued, results published in engineering periodicals, papers presented before engineering bodies, and information furnished to interested parties.

*Assignment.*—E. B. McCormick, E. B. Smith, F. H. Jackson.

*Proposed expenditure, 1914-15.*—\$4,510 (general expenses, \$3,850; statutory, \$660).

**Nonbituminous Road-Material Investigations:**

*Object.*—To obtain information on useful properties of nonbituminous road materials.

*Cooperation.*—Tests made on samples sent to laboratory by State highway commissioners, municipalities, and private individuals.

*Location.*—Washington, D. C.

*Date begun.*—Inception of office (1893) or before.

*Results.*—Several thousand samples tested and reports made to States, municipalities, corporations, and private individuals.

*Assignment.*—E. B. Smith, F. H. Jackson.

*Proposed expenditures, 1914-15.*—\$1,090 (general expenses, \$850; statutory, \$240).

**Standardization of Methods of Testing Nonbituminous Road Materials.**

*Object.*—The unification of methods of testing, to enable road engineers to obtain proper materials for construction of nonbituminous roads.

*Cooperation.*—American Society for Testing Materials.

*Location.*—Washington, D. C.

*Date begun.*—Inception of office (1893) or before.

*Results.*—Methods advocated by this office have been adopted as standards in colleges and elsewhere.

*Assignment.*—E. B. McCormick, E. B. Smith and F. H. Jackson.

*Proposed expenditures, 1914-15.*—\$540 (general expenses, \$300; statutory, \$240).

**Instrument Making and Repairing:**

*Object.*—To make and repair instruments needed to conduct road-material investigations. This work is incidental to the activities carried on in the laboratories, including the designing and construction of special scientific apparatus.

*Location.*—Washington, D. C.

*Date begun.*—Inception of office (1893) or before.

*Assignment.*—E. C. Glascock.

*Proposed expenditures, 1914-15.*—\$3,800 (general expenses, \$2,360; statutory \$1,440).

**Total, Road-Material Investigations, \$44,580 (general expenses, \$36,260; statutory, \$8,320).**

**FIELD EXPERIMENTS.****Investigations of the Relative Value of Road-Building Materials and Methods of Construction:**

*Object.*—To determine by experimentation the relative merits and values of various preparations and materials for use in road construction and of the various methods and types of road construction and maintenance.

*Cooperation.*—County and State officials in legal control of the roads and private citizens.

*Location.*—Montgomery County, Md., and Alexandria County, Va.

*Date begun.*—1911.

*Results.*—Bituminous macadam, water-bound macadam (surface treated with various organic and inorganic materials), bituminous concrete, Portland cement concrete (plain and surface treated), and brick roads have been built and maintained. Complete descriptions of this work have been published in circulars from year to year. Many highway engineers have visited these roads and have received valuable information. Information as to the relative values of the various materials has been secured.

*Assignment.*—Vernon M. Peirce.

*Proposed expenditures, 1914-15.*—\$45,000 (general expenses).

**Traction Tests:**

*Object.*—To determine the effect of width of tire, diameter of wheel, type and size of axle bearing, kind of power, and method of application of power on tractive effort required to haul vehicles over various types of road surfaces; also to determine the resistance offered to traction by the various road surfaces and by grades in the case of horse-drawn vehicles and automobiles.

**Traction Tests—Continued.**

*Location.*—Washington, D. C., post and experimental roads throughout the United States. (See "Results.")

*Date begun.*—1913.

*Results.*—Tests have been made in Iowa, Kansas, Minnesota, Alabama, Tennessee, Ohio, Maryland, District of Columbia, Virginia, and Maine.

*Probable date of completion.*—Two to five years.

*Assignment.*—E. B. McCormick, L. L. Beebe, Morgan Cilley, Elmer Johnson.

*Proposed expenditures, 1914-15.*—\$15,000 (general expenses).

**Total, Field Experiments, \$60,000 (general expenses).**

**INSECTICIDE AND FUNGICIDE BOARD.****ENFORCEMENT OF THE INSECTICIDE ACT OF 1910.****Administration:**

*Object.*—To carry on supervisory work in connection with the enforcement of the insecticide act, including maintenance of necessary records, attending to fiscal matters, accounting of property, correspondence, inspection work, etc.

*Cooperation.*—Bureaus of Animal Industry, Chemistry, Plant Industry, Entomology, and Office of Solicitor; Treasury, Commerce, and State Departments.

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—General compliance with the law is being obtained, resulting in great improvement in labeling and better and more standard grades of the products appearing on the market.

*Assignment.*—Executive Office: J. K. Haywood, J. G. Shibley.

*Proposed expenditures, 1914-15.*—\$37,074.84 (enforcement of insecticide act, including a reserve of \$10,641.59 for trial cases).

**Chemical, Microscopic, and Bacteriological Examination of Insecticides and Fungicides Other than Those Used on Horses, Cattle, Sheep, Swine, or Goats:**

*Object.*—To control traffic in domestic and foreign insecticides and fungicides mentioned; to improve methods of examining insecticides and fungicides; to aid manufacturers in methods of manufacture.

*Cooperation.*—Same as project "Administration."

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Same as stated under project "Administration."

*Assignment.*—Bureau of Chemistry: J. K. Haywood.

*Proposed expenditures, 1914-15.*—\$32,477.52 (enforcement of insecticide act).

**Testing Efficacy of Fungicides and Action on Foliage of Insecticides and Fungicides:**

*Object.*—To control traffic in domestic and foreign fungicides; to improve methods of testing; to secure data relative to the action of fungicides and substances entering therein; in collaboration with the Bureau of Entomology, to secure data regarding the injurious action of insecticides on vegetation.

*Cooperation.*—Same as "Administration."

*Location.*—Washington, D. C., Arlington Farm, and in leased orchards and truck patches.

*Date begun.*—1910.

*Results.*—Same as "Administration."

*Assignment.*—Bureau of Plant Industry: M. B. Waite.

*Proposed expenditures, 1914-15.*—\$6,933.18 (enforcement of insecticide act).

**Testing Efficacy of Insecticides and Their Action on Foliage:**

*Object.*—To control traffic in domestic and foreign insecticides; to improve methods of testing; to secure data relative to the action of insecticides and substances entering therein; in collaboration with the Bureau of Plant Industry, to secure data regarding the injurious action of insecticides on vegetation.

*Cooperation.*—Same as "Administration."

*Location.*—Washington, D. C., and Vienna, Va.

*Date begun.*—1910.

*Results.*—Same as "Administration."

*Assignment.*—Bureau of Entomology: A. L. Quaintance.

*Proposed expenditures, 1914-15.*—\$9,409.33 (enforcement of insecticide act).

### **Chemical and Bacteriological Examination of Insecticides and Fungicides Used on Horses, Cattle, Sheep, Swine, or Goats, and Efficacy Tests of Same:**

*Object.*—To control traffic in domestic and foreign insecticides and fungicides mentioned; to improve methods of examination and testing such insecticides and fungicides; to secure data relative to their action.

*Cooperation.*—Same as "Administration."

*Location.*—Washington, D. C.

*Date begun.*—1910.

*Results.*—Same as "Administration."

*Assignment.*—Bureau of Animal Industry: J. A. Emery.

*Proposed expenditures, 1914-15.*—\$9,105.13 (enforcement of insecticide act).

**Total, Enforcement of the Insecticide Act, \$95,000** (enforcement of insecticide act).

## **FEDERAL HORTICULTURAL BOARD.**

### **ENFORCEMENT OF THE PLANT QUARANTINE ACT.**

#### **Administration:**

*Object.*—To carry on administrative and clerical work necessary for the proper conduct of the field covered by the plant quarantine act.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Assignment.*—C. L. Marlatt and R. C. Althouse.

*Proposed expenditures, 1914-15.*—\$25,000 (enforcement of plant quarantine act).

#### **Control of Importations:**

*Object.*—To provide for foreign inspection and certification of nursery stock, potatoes, and other plant products; to secure prompt notification of arrival, and to provide for the proper inspection, either at port of entry or at place of destination, of such imports.

*Cooperation.*—State inspectors, customs officials, American consuls and postmasters, and inspectors in foreign countries.

*Location.*—Washington, D. C.

*Date begun.*—1912.

*Results.*—Regulations drawn covering all details, and general compliance therewith being secured; marked improvement in condition of nursery stock and plant products imported.

*Assignment.*—Under the direction of Federal Horticultural Board, consisting of C. L. Marlatt, chairman; W. A. Orton, Geo. B. Sudworth, W. D. Hunter, and A. V. Stubenrauch.

*Proposed expenditures, 1914-15.*—\$5,000 (enforcement of plant quarantine act).

#### **Foreign Plant Quarantines:**

*Object.*—To prevent the entry of plant material affected with white-pine blister rust, potato wart, powdery scab of potato, Mexican fruit fly, avocado weevil, the pink bollworm of cotton, and insect enemies and plant diseases of sugar cane.

*Cooperation.*—State inspectors, customs officials, American consuls and postmasters, and inspectors in foreign countries.

*Location.*—Washington, D. C., and ports of entry concerned.

*Date begun.*—1912.

*Results.*—Practical prohibition effected of articles covered; exceptional instances of entry followed up and goods destroyed.

*Assignment.*—Federal Horticultural Board.

*Proposed expenditures, 1914-15.*—\$5,000 (enforcement of plant quarantine act).

#### **Domestic Plant Quarantines:**

*Object.*—To prevent further distribution within the United States of the Mediterranean fruit fly, gipsy moth, brown-tail moth, date-palm scale insects, and insect enemies and plant diseases of sugar cane. (See also special project regarding potato inspection, which follows.)

*Cooperation.*—State commissioners of agriculture and horticulture, State inspectors, and postmasters, and particularly the Bureau of Entomology of this department.

*Location.*—Washington, D. C., with branch stations in districts particularly concerned by quarantines, including the New England States, eastern portion of Long Island; Webb County, Tex.; Yuma, Maricopa, and Pinal Counties, Ariz.; Riverside and Imperial Counties, Cal.; and Porto Rico and Hawaii.

**Domestic Plant Quarantines—Continued.***Date begun.*—1912.*Results.*—These quarantines now in full operation, with fairly adequate inspection service.*Assignment.*—Federal Horticultural Board.*Proposed expenditures, 1914-15.*—\$10,000 (enforcement of plant quarantine act).**Foreign Investigations:***Object.*—Investigation of insect or plant-disease conditions in foreign countries as a basis for needed quarantine action. This will include the securing of information as to the range of the Mexican fruit fly and avocado weevil in Mexico and the countries of Central America; investigation of foreign potatoes offered for import; supplementary investigations as may be necessary of foreign fruits, more particularly on account of fruit flies.*Cooperation.*—Experts in foreign countries.*Location.*—Foreign countries.*Date begun.*—1913.*Results.*—Preliminary investigation made of lemon and other fruits of Mediterranean countries as affected by Mediterranean fruit fly, and investigation of similar conditions in Mexico in relation to Mexican fruit fly; field investigation of half a dozen European countries in relation to the powdery-scab disease of potatoes.*Assignment.*—Federal Horticultural Board.*Proposed expenditures, 1914-15.*—\$5,000 (enforcement of plant quarantine act).**Total, Enforcement of the Plant Quarantine Act, \$50,000** (enforcement of plant quarantine act).**DOMESTIC POTATO INSPECTION.****Inspection of Potatoes for Interstate Shipment from Areas Quarantined for Powdery Scab:***Object.*—To permit the movement of healthy potatoes from quarantined areas and to cooperate with the Maine State Department of Agriculture to secure the eradication of powdery scab.*Cooperation.*—Bureau of Plant Industry and Maine Department of Agriculture.*Location.*—State of Maine, particularly Aroostook County; headquarters at Caribou, Me.*Date begun.*—July 1, 1914.*Assignment.*—W. Blair Clark.*Proposed expenditures, 1914-15.*—\$50,000 (domestic potato inspection).**Total, Federal Horticultural Board, \$100,000** (enforcement of plant quarantine act, \$50,000; domestic potato inspection, \$50,000).**OFFICE OF MARKETS AND RURAL ORGANIZATION.****MARKETING AND DISTRIBUTION INVESTIGATIONS.****Administration:***Object.*—Supervision of the scientific, investigational, experimental, and demonstrational work of the other projects of the Office of Markets, and the execution of the necessary administrative work connected therewith.*Location.*—Washington, D. C.*Date begun.*—1913.*Assignment.*—Charles J. Brand.*Proposed expenditures, 1914-15.*—\$48,140 (marketing and distributing farm products).**Cotton Handling and Marketing Investigations:***Object.*—To investigate the ginning, baling, compressing, warehousing, handling, classification, marketing, utilization, commercial value of varieties, and proper application of commercial standards of cotton, including cottonseed and its products and cotton linters. Special attention will be given to the following lines:

1. Study of improved plans and systems of machinery for gin houses, including cleaning or preparatory machinery, cleaner feeders, latest model gins, improved condensers, hydraulic presses, conveyors, and the like.

**Cotton Handling and Marketing Investigations—Continued.**

2. The advantages of gin compression and the best types of gin compresses will be pointed out.

3. Studies of conditions in primary markets will be broadened to include an investigation of the marketing of long-staple cotton.

4. A tabulation of the location and capacity of the cotton warehouses will be made, and an effort will be made to point out the advantages of warehouses and organized marketing to those sections which are without adequate facilities for selling cotton advantageously.

5. Help and encouragement will be given to cooperative farmers' organizations in the sale of cotton and cottonseed.

6. The study of the relation between cotton exchanges and producers of cotton will be continued.

7. A thorough investigation into the marketing and utilization of cottonseed will be undertaken by an expert in this line of work.

*Cooperation.*—Bureau of Plant Industry.

*Location.*—Washington, D. C., cotton-growing States, and manufacturing centers of New England and Atlantic States.

*Date begun.*—1912 (Bureau of Plant Industry).

*Results.*—Definite conclusions as to the most satisfactory methods of ginning, baling, and compressing. Survey of primary cotton-market conditions in Oklahoma.

An investigation of economic conditions in the Sea Island cotton industry has been made and a bulletin thereon is now ready for the press.

Spinning tests have been made on different varieties of long-staple Upland cottons and a bulletin entitled "Spinning Tests of Upland Long-Staple Cottons" is now in press.

Assistance has been given farmers' cooperative organizations at Scott and Atkins, Ark., and Sacaton, Mesa, Tempe, Phoenix, and Glendale, Ariz., in handling and selling cotton.

The following publications have been issued: An article on pages 46-48, Report No. 98, of the Department of Agriculture, entitled "Systems of Marketing Farm Products at Trade Centers"; 1912 Yearbook article, entitled "Improved Methods of Handling and Marketing Cotton"; Department Bulletin No. 36, entitled "Studies of Primary Cotton Market Conditions in Oklahoma"; Bureau of Plant Industry Circular No. 123, entitled "Behavior of Seed Cotton in Farm Storage."

*Assignment.*—Charles J. Brand, Wells A. Sherman, Fred Taylor, William R. Meadows, David C. Griffith, Joseph G. Martin, Robert W. Murray, and George E. Carr.

*Proposed expenditures, 1914-15.*—\$37,000 (marketing and distributing farm products).

**Cooperative Production and Marketing Investigations:**

*Object.*—To investigate organized and cooperative production and marketing, cooperative purchasing and distributing, auditing and accounting systems of cooperative organizations; to furnish the resulting information to farmers, farmers' organizations, societies of consumers, and others interested in marketing problems; and to carry on demonstrational work in cooperative handling, marketing, and distribution.

*Location.*—Washington, D. C., and at various points throughout the United States.

*Date begun.*—1913.

*Results.*—Conditions have been investigated in about 30 districts and suggestions and assistance given to local associations. Systems of accounting and auditing and forms of by-laws have been developed for cooperative associations, egg circles, etc. A register of cooperative marketing associations has been established, and in reply to specific inquiries many of these organizations have been given full information by mail.

*Assignment.*—Charles J. Brand, C. E. Bassett, C. W. Moomaw, J. A. Vye, W. H. Kerr, and G. A. Nahstoll.

*Proposed expenditures, 1914-15.*—\$16,500 (marketing and distributing farm products).

**Market Surveys, Methods, and Costs:**

*Object.*—To make surveys of available market supplies in areas of surplus commercial production and record the progress of marketing the crops in order to give out reliable information to competing areas, dealers, transportation companies, and all other interested parties; to study the demand for various products at consuming centers and investigate the possibilities of increasing the distribution in an economical way; to study the distributing and marketing systems now in vogue which take the products from primary markets to the wholesale dealer in consuming centers, such as commission, brokerage, f. o. b. selling, auction, etc.; to investigate the costs of different systems of marketing by following products from grower to consumer and recording all added charges.

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1913.

*Results.*—Lists of producers, producers' organizations, shippers, and transportation agents and officials, from whom information in regard to various crops is to be secured in season, are now in process of compilation and are well organized for potatoes, strawberries, and peaches. Those for apples and tomatoes are being started. A special survey was made in the fall of 1913 of the commercial surplus of cabbage and onions, for the information of southern growers, to guide them in planting. An investigation of marketing methods and costs is in its formative stage.

*Assignment.*—Charles J. Brand, Wells A. Sherman, C. T. More, and G. V. Branch.  
*Proposed expenditures, 1914-15.*—\$19,360 (marketing and distributing farm products).

**Market Grades and Standards:**

*Object.*—The investigation of present methods of gathering, grading, packing, and shipping farm products, to determine efficient and inefficient methods, and the education of the producer and shipper in best methods and as to the value of fixed grades and standards. This work looks toward the national standardization of grades, standards, weights, measures, and containers and uniform trade names for same. Information of this character should be useful when new legislation comes up or is needed. It is believed advisable in connection with this project that studies looking toward the standardization of wool, sirup, and certain other products should be taken up as soon as practicable in cooperation with the Bureau of Animal Industry.

*Location.*—Washington, D. C., and the producing sections and their markets.

*Date begun.*—1913.

*Results.*—Studies of State and national laws governing grades, standards, weights, measures, packages, and containers are kept up to date. Special attention has been given to the abuses, needs, and merits of methods and standards now in use. A representative collection of shipping containers from all parts of the country has been made.

*Assignment.*—Charles J. Brand, C. T. More, G. V. Branch, C. W. Moomaw, and H. F. Walker.

*Proposed expenditures, 1914-15.*—\$16,000 (marketing and distributing farm products).

**City Marketing and Distribution:**

*Object.*—To investigate distribution and marketing problems peculiar to provisioning of urban populations, in order to determine and encourage the practice of the best methods. This project will involve personal investigations of marketing conditions, including public markets, wholesale terminal markets, auctions, and other means of distributing food products in cities. There is a constantly increasing demand from cities all over the country for advice and aid; this will be met as far as possible.

*Cooperation.*—District of Columbia (informal).

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1913.

*Results.*—City marketing surveys have been made upon request in Jackson, Mich.; Providence, R. I.; Trenton, N. J.; Philadelphia, Pa.; St. Louis, Mo., and Washington, D. C., and reports have been made thereon with advice and suggestions for improved marketing facilities. A large amount of general investigational work has been done in studying the possibilities of municipal markets of various types and the advantage of wholesale terminal markets. A number of cities have been assisted through correspondence in establishing new markets or bettering old ones.

*Assignment.*—Charles J. Brand and G. V. Branch.

*Proposed expenditures, 1914-15.*—\$12,000 (marketing and distributing farm products).

**Transportation and Storage Problems:**

*Object.*—To investigate problems in the transportation, storage, and distribution of farm products. It is proposed to study the various railroads for different commodities and in different sections of the country, as the basis for outlining reports of movement of principal commodities from producing sections to consuming centers; to ascertain extent of electric-line freight service now offered producers marketing in Washington City and the extent of the demand for additional service; to study car supply for moving crops to market.

*Cooperation.*—Informal cooperation with Bureau of Plant Industry, Bureau of Animal Industry, Bureau of Chemistry, and with the Interstate Commerce Commission.

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1913.

*Results.*—Compilation and digest of demurrage laws and regulations effective in the various States on intrastate and interstate traffic; survey of service furnished by electric and steam roads throughout the United States in the matter of iced pick-up cars and special market trains; completed studies of certain phases of the transportation problems peculiar to various market centers, etc.

*Assignment.*—Charles J. Brand and G. C. White.

*Proposed expenditures, 1914-15.*—\$10,000 (marketing and distributing farm products).

**Marketing Miscellaneous Products, and Collaboration:**

*Object.*—To investigate the marketing of animal products, including live stock, meats, poultry, eggs, wool, dairy, and other products; to conduct marketing and statistical investigations of specific products, classes of products and trade movements, and to develop foreign markets.

*Cooperation.*—Bureaus of Chemistry, Plant Industry, Animal Industry, Crop Estimates, and the Forest Service, of the Department of Agriculture; and the Bureau of Foreign and Domestic Commerce, of the Department of Commerce.

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1914.

*Results.*—Plans for cooperative investigations of butter marketing in the Northwest are being outlined. Investigations of the marketing of live stock, meats, and by-products have been undertaken, especially of (1) local live-stock markets, including local abattoirs, (2) wholesale and retail meat markets, (3) market classifications of live stock and meats, and (4) methods and cost of marketing live stock, meats, and by-products.

*Assignment.*—Charles J. Brand, J. A. Vye, and L. D. Hall.

*Proposed expenditures, 1914-15.*—\$30,000 (marketing and distributing farm products).

**Marketing by Parcel Post:**

*Object.*—To determine feasibility of marketing various farm products by parcel post from producer to the consumer direct, and the best methods to be used. The practicability of marketing butter, berries, fruits, and vegetables is to be determined; also the possibility of shipping milk and cream by parcel post where other means of transportation are not available.

*Cooperation.*—United States Post Office Department and Bureaus of Chemistry and Animal Industry, in the Department of Agriculture.

*Location.*—Washington, D. C., and in the field.

*Date begun.*—1913.

*Results.*—A study of marketing eggs in quantities up to 10 dozen has been made and the results published in Farmers' Bulletin 594, entitled "Shipping Eggs by Parcel Post." Numerous experimental shipments of various vegetables, berries, and butter have been made.

*Assignment.*—Charles J. Brand, Lewis B. Flohr, Guy Fitzpatrick, and John W. Law.

*Proposed expenditures, 1914-15.*—\$11,000 (marketing and distributing farm products).

**Total, Marketing and Distribution Investigations, \$200,000** (marketing and distributing farm products).

**RURAL ORGANIZATION INVESTIGATIONS.****Administration:**

*Object.*—Supervision of the scientific, investigational, experimental, and demonstrational work of the other projects of the Office of Rural Organization, and the execution of the necessary clerical and administrative work connected therewith.

*Location.*—Washington, D. C.

*Date begun.*—1913.

*Assignment.*—Charles J. Brand, assisted by C. W. Thompson.

*Proposed expenditures, 1914-15.*—\$13,800 (rural organization).

**Rural Credits, Insurance, and Communication:**

*Object.*—To investigate problems relating to the organization of rural communities (1) for developing rural credit and promoting the financing of agricultural activities, including the purchasing of supplies, the prosecution of agricultural activities, and the marketing of farm products; (2) mutual protection against agricultural losses; and (3) to improve the means and methods of rural communication.

It is planned to make surveys of (1) the uses and abuses of store and machinery credit; (2) financing the breeding, feeding, and marketing of live stock; (3) the existing successful organizations which are performing the functions of rural credit banks; (4) various leasing, crop-lien, store-credit, and tenancy systems; (5) rural insurance organizations and methods, and cooperative and other rural telephones; and (6) cooperative methods and means of rural communication.

*Location.*—Washington, D. C., and temporary points in the field.

*Date begun.*—1913.

*Results.*—Extensive preliminary survey work begun and much valuable statistical and other data secured; assistance given to the subcommittee of the House Committee on Banking charged with the drafting of rural-credits legislation.

*Assignment.*—C. W. Thompson.

*Proposed expenditures, 1914-15.*—\$13,500 (rural organization).

**Rural Social and Educational Activities:**

*Object.*—To investigate cooperative organizations endeavoring to improve conditions of education, health, recreation, household economy, and beautification in rural life; to determine how methods may be improved; to supply information or other assistance to such associations; and to cooperate with other agencies in this work. This work will involve the making of surveys (1) of existing social and educational organizations, and (2) of openings or opportunities for forming such organizations.

*Location.*—Washington, D. C., and temporary points in the field.

*Date begun.*—1913.

*Results.*—Studies have been made of various local organizations and some valuable information has been secured.

*Assignment.*—C. W. Thompson.

*Proposed expenditures, 1914-15.*—\$12,700 (rural organization).

**Total, Rural Organization Investigations, \$40,000 (rural organization).**

**Total, Office of Markets and Rural Organization, \$240,000 (markets, \$200,000; rural organization, \$40,000).**

**DEMONSTRATIONS ON RECLAMATION PROJECTS.****Supervision:**

*Object.*—To supervise demonstration work on Government reclamation projects and to conduct routine office business in connection therewith.

*Location.*—Headquarters, Washington, D. C.; field operations on reclamation projects.

*Date begun.*—July 1, 1914.

*Results.*—Work just being organized.

*Assignment.*—F. D. Farrell.

*Proposed expenditures, 1914-15.*—\$5,500 (demonstrations on reclamation projects).

**Field Demonstrations:**

*Object.*—To encourage and aid the settlers on the reclamation projects in the development of local agricultural industries by supplying information, making suggestions, and conducting demonstrations relating to agricultural industries and farm practices, and by assisting in the formation and conduct of farmers' organizations, for the purpose of improving the methods of production and disposal, methods of securing the financial assistance necessary, and bettering agricultural conditions generally. (See Bureau of Animal Industry program for reference to live-stock features of the work.)

*Cooperation.*—Reclamation Service, Bureau of Animal Industry, and other branches of the department; individual farmers, and farmers' organizations.

*Location.*—Government reclamation projects in the western United States; definite locations to be determined later.

*Date begun.*—July 1, 1914.

*Results.*—Work just starting.

*Assignment.*—F. D. Farrell and representatives of cooperating bureaus. Mr. Farrell has general direction of the work and special charge of plant-industry features. C. S. Jones, in charge of animal-industry phases.

## LIVE-STOCK PRODUCTION IN SUGAR-CANE AND COTTON DISTRICTS.

*Object.*—To make such investigations and demonstrations as may be necessary in connection with the development of live-stock production in the sugar-cane and cotton districts of the South. All of the investigations and demonstrations will be under the general charge of a committee of three, consisting of one representative each of the Bureau of Plant Industry, the Bureau of Animal Industry, and the Louisiana Experiment Station. The work has not yet been fully organized, but the following general plan is proposed:

(1) The organization and management of a field station, at which will be conducted large-scale experiments in the rearing and feeding of dairy and beef cattle, hogs, poultry, and possibly mules. The necessary land for this purpose, consisting of 500 acres, will be furnished by the State Penitentiary Board of Louisiana. The details of this feature of the work will be directed by the representative of the Bureau of Animal Industry. Experiments in the growing of forage and other crops incidental to live-stock production will be conducted, the details of such investigations to be directed by the representative of the Bureau of Plant Industry.

(2) Extension work in live-stock production, to be directed by the representative of the Louisiana Station.

*Cooperation.*—Bureaus of Plant Industry and Animal Industry, Louisiana Experiment Station, State Penitentiary Board of Louisiana, and individual farmers.

*Location.*—Points in Louisiana, to be selected.

*Date begun.*—July, 1914.

*Assignment.*—W. A. Taylor and B. H. Rawl, of the department, and W. R. Dodson, of the Louisiana Experiment Station.

*Proposed expenditures, 1914-15.*—\$60,000 (live-stock production).



